investments in agriculture, the building of an estimated 120,000 cottages, mostly out of private funds, and the electrification of 500 villages are cited, besides the reconstruction of a large fertilizer and explosives works, the enlargement of a big tractor and armored car plant, etc.

A rather surprising achievement was the great increase in the area of the state-owned estates to 312,000 hectares from 151,000 hectares in 1938. In addition, 213,000 hectares were farmed by collectives. As all the forests became state property in 1945 and the state also owned fisheries and other agricultural property, the total "collective" sector in agriculture covered 1.5 million hectares—18 percent of the total acreage and 7 percent of the acreage under crops.

Mining and Metallurgy

The plan aimed at raising the value of the gross output of mining and metallurgy from 1.1 billion forints in 1946-47 to 1.2 billion in the first year and 1.5 billion in the third when a level 38 percent above prewar was to be reached. The prewar output was 1.2 billion forints. As there had been considerable development in the years 1938-44, and the gross output may have been near the 2.0 billion mark in 1944, the mark set was somewhat lower than the level that had been reached.

The goals looked more formidable when compared with the output in 1946-47, although recovery in mining, especially coal, had been fairly quick. They are set out in the following table:

Output, million tons

	Planned		Actual		
	1949-50	1947-48	1946-47	1948	(1943)
Coal	11.60	9.30	7.75	9.34	(12.70)
Iron ore	0.28	0.21	0.21	0.30	(0.34)
Bauxite	0.40	0.22	0.25	0.54	(1.00)
Oil	0.66	0.54[20]	0.64	0.04	(0.84)

For the development of the mining industry, 493 million forints were earmarked. This sum was to be used for the reconditioning of existing mines, some mechanization of coal mining, the developing of new pits, and the building of two flotation plants to utilize low-grade ores.

20. Oil production was forced during the war under German pressure and was maintained at a high level under Russian management in 1945-47. It had to be reduced in order to prevent the untimely exhaustion of the wells.

THE THREE YEAR PLAN OF 1947 - 1949

In the first year the budgeted sum was exceeded by 15 percent, but no information is available concerning the final sum spent. In the Final Report, no separate figures are given for mining which is lumped together with heavy industry. It was claimed that seven new pits had been opened; progress had been made with mechanization and two flotation plants had been built to utilize low-grade ores.[21]

Production in the first year increased considerably and, except for oil, exceeded the aims set, especially in manganese ore. The output of coal reached 9.9 million tons, iron ore 258,000 tons, bauxite 400,000 tons, and oil 496,000 tons. For 1949 only percentages are available. Translated into quantities, production appears to have reached 11.8 million tons in coal, 339,000 tons in iron ore, 561,000 tons in bauxite, and 503,000 tons in oil. Compared with the targets set for 1949-50, the output of iron ore and bauxite were considerably higher than originally planned, the output of coal was slightly higher, while oil was 24 percent less.[22]

According to the text of the plan, metallurgy ranked second only to mining in importance. The aim was to raise the production of pig iron from 258,000 tons in 1946-47 to 360,000 tons in the first year and to 420,000 tons in the third; steel production from 510,000 tons to 660,000 tons, and 800,000 tons respectively. Production in 1938 amounted to 335,000 tons in pig iron and 647,000 tons in steel and reached 417,000 and 776,000 tons respectively in 1943. Besides increasing output, efficiency of production was to be improved through the reconditioning and modernizing of the plants, undertaking the production of ferromanganese and resuming the production of ferrosilica.[23]

Investments in metallurgy were to total 26 million forints in the first year and 58 million forints in three years. In addition, 20 million forints were to be invested in aluminum metallurgy and 166 million in the processing of bauxite.[24]

It was aimed to raise aluminum production from 3,700 tons in 1946-47 to 5,000 tons in the first year and 12,000 tons in the

21. One in Ozd for iron ore and one in Diosgyoer for manganese.

22. For volume of aggregate output see Tables IV, Va and Vb in the Appendix.

23. Before the war Hungary exported low-grade manganese ore and imported ferromanganese. The ferrosilica plant (Zagyvarona) was destroyed during the war.

24. Investments in metallurgy are scattered under various sections. Iron metallurgy is a section by itself, aluminum metallurgy appears under the iron and metal industry, the processing of bauxite into aluminum oxide under the chemical industry.

12; Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

FOREWORD

000 The subject of oil is particularly interesting due to its many important aspects—economic, political, and military. America's oil resources and production have had a profound influence on the whole development of her national and international life for more than half a century.

• 315 Compared to America's huge oil resources and allied industries, Hungary's natural wealth in oil and the development of her petroleum industry are of comparative unimportance; but from a European frame of reference, and with communist Hungary an economic and political Russian pawn, Hungary's oil assumes an entirely different aspect and importance.

315
121 It is a significant economic fact that the Hungarian oil industry became in the 1940's one of the few in oil-poor Europe with an exportable surplus. This study covers the history of oil exploration, exploitation, and refining in Hungary from their beginnings. If today Hungary were a free and democratic country in a normal and a peaceful world, her oil industry would be a valuable asset in her economic reconstruction. Hungary's captive economy is almost completely integrated into the Soviet economic orbit. Her natural resources, like her people, have become mere economic units figuring in over-all planning originating in Moscow rather than Budapest.

This study has been compiled by experts and consultants of the staff of the Mid-European Studies Center familiar with every phase of the Hungarian petroleum industry.

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

neighbors, aimed at self-sufficiency. Industry was granted additional subsidies in the form of loans, cheap factory sites, and other measures. Together with low world market prices this policy was responsible for the depressed state of Hungarian agriculture from 1928 until about 1934, but all subsequent governments adhered to the industrialization program and frequently carried it further.

The runaway inflation of the mid-twenties disrupted the country's finances, wiping out individual savings and ruining many companies.

During the early twenties the Hungarian Oil Syndicate (an affiliate of the Anglo-Persian Oil Company) started explorations in western Hungary while the government carried out explorations east of the Danube. However, the Hungarian Oil Syndicate lost most of its exploration funds during the period of inflation and this coupled with unsuccessful drilling operations forced the company to abandon operations and pull out of Hungary. The government was also unsuccessful in this period, its only discovery that at Bükkszék, which resulted in the production of only 92,500 barrels over a thirteen-year period, much of it at an actual financial loss.

In 1933 the government granted a five-year concession for all areas west of the Danube to Eurogasco (an affiliate of the Standard Oil Company of New Jersey) in return for a pledge that $300,000 would be spent on prospecting and that at least eight wells would be drilled. Eurogasco's activities led to the discovery of the first commercial oil field in 1937 situated at Lispe, Zala County, near the old wells of the Mura district which were ceded to Yugoslavia in 1920. In 1940 a second field was developed nearby, at Lovászi. An eight-inch pipeline connecting the Zala fields with Budapest was completed in 1941. In that year Hungary reached self-sufficiency in oil production, and her 1943 output of 838,000 tons of crude contrasted with a (controlled) civilian consumption of only about 321,000 tons of refinery products (about 380,000 tons of crude equivalent). Table VI gives the civilian consumption for the years 1940-1943. More than half of the pro-

[Cf. page 88, category 116 -- Analyst]

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

duction was thus available for the armed forces or for export to Germany.

A new operating company, the Hungarian-American Oil Company (MAORT), a subsidiary of Eurogasco, obtained a forty-year concession soon after the Lispe discovery under the same arrangements as had been made with Eurogasco whereby the royalties to be paid to the government were fixed at 15 percent of the crude oil and 12 percent of the marketed natural gas production. MAORT achieved such successful results that in less than six years it became Hungary's third largest industrial enterprise and, considering the indirect effects, probably the largest single corporate contributor to the national income.

During the late thirties the economic aspects of agriculture improved due to ever increasing agricultural exports to Germany under the Hungarian-German trade agreements, even though protection of industry remained the official policy of the government.

In 1938 Hungary began to rearm. With Axis support parts of the territories lost in 1920 were recovered from Czechoslovakia in 1938 and 1939, from Romania in 1940, and from Yugoslavia in 1941. As a result, the country's area increased from 93,073 square kilometers in 1938 to 170,869 square kilometers in 1941 with a corresponding increase in population from less than 9 million to 14.6 million. In 1941 Hungary entered World War II on the German side.

Rearmament, the recovery of about half of the pre-Trianon territory, and finally war gave a tremendous impetus to the economy. Industrial employment rose from 289,000 in 1938 to 392,000 in 1943 (excluding the recovered areas), and, for the first time, the value of the industrial output surpassed the value of agricultural production.

Government controls gradually increased. The allocation of raw materials and the rationing of food and gasoline were introduced, and for the first time in Hungarian history the government embarked on large-scale economic planning.

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

The "Billion Pengő Plan," officially known as the Five-Year Plan of 1938, was primarily a result of military considerations. Originally calling for an investment of one billion pengős, it was repeatedly revised upward until it reached 4.5 billion by 1943. Roughly three-fifths of the total funds were devoted to rearmament and to the heavy industries, while transportation and agriculture received one-fifth each. The plan was financed by a progressive capital levy and by government borrowing. It was carried out through the existing ministries by simply expanding their activities. A Ten-Year Plan for Agriculture calling for the investment of 100 million pengős annually was launched in 1942, but wartime dislocations prevented its realization.

By the spring of 1944 the power, aluminum, chemical, and oil industries had been considerably enlarged. The total Hungarian refining capacity was estimated as 3.5 million barrels annually before the territorial losses of 1920; as 1.5 million barrels in 1920; and was 3.2 million barrels in 1940. In contrast to this relatively modest development, by the spring of 1944, the total capacity had increased to more than 10 million barrels, only 710,000 of which were from refineries located in the temporarily recovered areas. The new plants at Pét and Szőny, which were built by the government within the framework of the Five-Year Plan of 1938, had a combined capacity of 3.6 million barrels; these plants alone considerably exceeded the total 1940 capacity.

During World War II numerous concessions were granted to German and Italian as well as domestic oil companies in the areas east of the Danube and in the recovered areas. These groups carried out extensive geophysical surveying and a few test wells were drilled. However, it was only in the Mura district, close to the Hungarian Zala fields that commercial discoveries were made. Small-scale production began in 1943. Two years later, in 1945, Yugoslavia recovered the district once more.

At the end of World War II the economy was once more at a standstill. In 1945 agricultural production did not reach one half of prewar production, while industrial output was only a fraction of that of 1938. Of 4,341 factories

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

727 433 [434] only 186 were working at over 70 percent of prewar capacity, while 1,109, or over 25 percent, were completely out of operation. It is estimated that even in 1946/47 the national income was only 65 percent that of 1938 and less than 50 percent that of 1943, the peak war year. The Hungarian economy as a whole, and especially the industrial sector, heavily concentrated in Budapest, was among those most seriously damaged in Europe.

[458] The Soviet occupation, heavy reparations payments, general political uncertainty, and a runaway inflation in 1946 made the task of reconstruction even more difficult.

728 471 648 According to the Potsdam agreement all Axis property, even that which had been forcibly taken over by the Germans during the war was handed over to the Soviet Union. Subsequently, new Soviet-Hungarian companies began to mushroom in manufacturing as well as in transportation, and it was at this time that the Hungarian-Soviet Oil Company, Maszovol, was organized.

727 315 [471] While the Zala fields had escaped major war damage they suffered by the wasteful practices engaged in under pressure from German and later Soviet military authorities (see Table VII).[1] After prolonged negotiations the MAORT properties (all areas west of the Danube) were returned to the American owners in 1946.

727 178 471 A land reform and the nationalization of industries "with monopolistic character" such as steel and coal were swiftly carried out after the war.

[565] Land reform, nationalization without compensation, and the inflation of 1946 largely destroyed the propertied classes, and in the chaotic conditions a downward leveling also affected the skilled workers.

[642] 727 185 [665] By mid-1947 the communists within the coalition government had virtually eliminated any possibility for non-communist government plans, and for all practical economic purposes the communists were in control. Dictated by the realities of the prevailing postwar conditions, certain

[1] [Cf. page 88, category 116 -- Analyst]

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

185 was at once a reconstruction, production, and investment program, with emphasis on the first, those investments that would have an immediate effect on production and would eliminate bottlenecks being given priority.

[647] A National Planning Office was set up to detail the plan, which had been approved only in outline by the party [652] leadership. The Investment Bank and the Bank of Issue were in charge of financing operations. All activities were supervised by the Supreme Economic Council and by the Cabinet.

652 454 Of the investment of 6.6 billion forints called for by the plan (1 forint was equal to 8.52 United States cents at the official rate), agriculture was to receive 2.0; mining and manufacturing, 1.7; transport, 1.7; and building, 1.2 billion forints. Included under "agriculture" were such items as tractor and fertilizer plants, road building, rural electrification, irrigation projects, and the establishment of tractor stations. Sixty-seven percent of the total was to be met from treasury funds (taxes and loans), 18 percent by local authorities and government agencies, and the balance by cooperatives (4 percent), remaining private sources (9 percent), and Soviet-Hungarian companies (2 percent).

185 After a very promising start the plan was speeded up and it was concluded by 1 January 1950 instead of 1 August of the same year.

185 315 433 Oil was among the few basic commodities that fell considerably short of the goals. The plan called for production of 540,000 tons in 1947/48 and for 660,000 tons in 1949/50 which was later moved up to 1949 under the speed-up program. In contrast with these high expectations the actual output was only 475,000 tons (3,600,000 barrels) in 1948 and a little below 500,000 tons (3,800,000 barrels) in 1949. Thus, only 75 percent of the plan was fulfilled in oil production, and the 1949 output remained at but 59 percent of the wartime peak of 1943.

000 While mechanization in agriculture progressed, 211

1/ [sic -- Analyst]

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

Operations in the oil fields had been little disturbed by the war, and in the immediate postwar period production was maintained at a relatively high level. The 1945 crude production of 656,000 tons (4,990,000 barrels) and the 1946 output of 675,000 tons (5,130,000 barrels) was exceeded only during the peak war years, and represented one of the few bright spots in the otherwise rather bleak economic picture. However, neither the owners of MAORT nor the Hungarian economy benefited very much from this production. In 1945-1946, the bulk of the crude went to the Red Army without payment, while in the following years, 1946-1948, much went to the Soviet Union and neighboring satellites as forced exports or as reparations. During this period the crude had to be delivered to the government at arbitrarily fixed prices.

In the spring of 1948, paralleling the second wave of nationalization, the directors of MAORT were tried for sabotage of the Three-Year Plan, and soon after the company was confiscated. Subsequently, MAORT was subdivided into several "National Enterprises." Crude production fell to 569,000 tons (4,324,000 barrels) in 1947 and fluctuated between 475,000 and 500,000 tons (3,610,000 and 3,800,000 barrels) during the following three years. As noted above, the targets set in the Three-Year Plan were not reached, and by 1949 the persistent crisis in the oil industry became one of the planners' major problems.

The old Zala fields were nearing depletion and could no longer continue the forced production records of wartime, while the expected new discoveries did not materialize. An acute shortage of drilling equipment, lack of skilled labor, and successive purges of management materially contributed to this failure.

In eastern Hungary, the German-held MANAT concession was handed over to Soviet ownership. A Soviet-Hungarian Oil Company, Maszovol, was organized in 1946. Extensive oil explorations were carried out but no commercial oil discoveries were made until the end of 1949.

Hungary's refineries, unlike her oil fields, were very severely damaged during the war. Refining capacity,

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

185
454 6 billion or 21 percent in 1950; and 8.75 billion or 24.5 percent in 1951. To these investment figures very considerable inventory increases must be added, without which the constantly accelerating expansion program would be impossible. Inventory increases absorbed an additional 4 to 5 percent of the national income or about 0.85 billion forints in 1947/48 and perhaps as much as 1.7 billion in 1951, also figured in constant January 1947 forints. Thus, investments and inventory increases amounted to 10.4 billion forints (roughly 886 million dollars) and nearly) percent of the national income in 1951 compared with only 2.85 billion forints (about 242 million dollars) and 15 percent of the national income in 1947/48.

Revisions of the plan also gave an ever increasing share of investments to heavy industries at the expense of consumer goods industries and of agriculture. The share of heavy industry in total investments increased from 18.6 percent in 1938 to 32 percent in 1947/48, 40.5 percent in 1950 and 48 percent in 1951; and to this must be added hidden investments listed for propaganda purposes as housing, and other indirect expenditures, such as the expansion of the transportation system. By contrast the consumer goods industry's share in new investments declined constantly from 9.2 percent in 1938 to 3.6 percent in 1951.

433 Most actual production data is not available, or is highly controversial. Output data for 1952 claimed or calculated from officially released percentage increase figures are as follows: coal "more than" 18 million tons, steel 1.4 million tons, electric energy 3.7 billion kilowatt-hours. The 1954 production goals call for 27.5 million tons of coal (mostly lignite), 2.2 million tons of steel, and 6.05 billion kilowatt-hours of electric energy.

315
382
433 Nothing was said in the plans about the crude oil or the refining industries beyond general statements to the effect that they will be greatly expanded.

654
315 It appears that after the dismal failure to reach the crude production targets of the Three-Year Plan, long-range plans were drawn up only in terms of explora-

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

654
315

tions to be made and number of meters to be drilled. These plans remain communist state secrets, but it is evident from a wealth of private reports as well as scattered official pronouncements that geological and geophysical explorations are being carried out at a scale hitherto unknown in Hungary. The 1953 drilling plan, as an example, calls for 263,000 meters (852,800 feet) of new wells, or more than five times the MAORT average in the years 1937-1945.

315
433

Crude production in 1950 remained unchanged at the 1949 level of 490,000 tons (3,724,000 barrels) and fell to 475,000 tons (3,610,000 barrels) in 1951. The old Zala fields continued to decline, a loss which was not quite made up by the production of newly discovered fields. The year 1952 appears to have been a turning point in crude production. At least one important new field began producing north of the old Zala fields, and there were reports of scattered production elsewhere in Transdanubia and in northeastern Hungary. Production rose to 560,000 tons (4,250,000 barrels) overfulfilling the yearly plan, and according to official statements was held back only by transportation bottlenecks. The 1953 plan is 25 percent over the 1952 output or slightly over 700,000 tons (5,320,000 barrels). According to official reports in the first quarter of 1953 the plan was fulfilled.

382

Knowledge of the refining industry is much less complete than that of crude production. It is known, however, that the industry as a whole has been considerably expanded. A large new refinery was reportedly built in southwestern Hungary at Nagykanizsa to process much of the output of the nearby Zala fields. The modernized and expanded old plants along the Danube at Szöny and Almásfüzitö as well as those in the Budapest area are refining primarily imported Austrian crude.

382
433

Total refining capacity as of 1952 is estimated as 2,500,000 tons (19,000,000 barrels) annually, but a high percentage of this capacity is equipped only for fractional distillation. Although no reliable direct information is available, it would appear that the refineries operated

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

THE OIL INDUSTRY IN THE HUNGARIAN ECONOMY

[135] 431 315

The following year[1] oil was discovered in Transdanubia and by 1941 Hungary had completed the transition from an oil importing to an oil exporting nation. The relevant data for these important transition years are found in Table VIII.[2]

There are no precise export-import data available for the chaotic years 1944 and 1945, when Hungary was a battlefield and the oil fields were under first German then Red Army supervision. It is known, however, that crude [438] production in 1944 amounted to 810,000 tons of which some 500,000 tons were exported to Germany or were used up by the German Army in Hungary. Similarly, of the 1945 production of 656,000 tons the Germans took about 100,000 tons while the Red Army seized over 400,000 tons.

Oil exports played a major part in Hungary's reviving postwar foreign trade. In contrast to the war years, when the bulk of the Hungarian oil was shipped westward to Germany, the postwar exports went east to the Soviet Union, with smaller quantities being taken by Yugoslavia, Czechoslovakia, and Poland. Exports amounted to 340,000 tons in 1946 and to 251,500 tons in 1947. Of these 135,000 tons and 25,000 tons respectively were on the war reparations account.

439 382

Beginning in September 1948 statistical secrecy was imposed on export-import figures by the communist government. Despite the complete lack of any official information it has been possible to estimate the "exportable surplus" of oil for the five years following 1947. This method involves the determination of the domestic crude production and the calculation of the domestic consumption from such secondary information as the number of trucks and cars, the level of industrial activity, and other contributing factors. By subtracting the domestic consumption from the domestic production we obtain the "exportable surplus" quantities. It must be remembered, of course, that these data, however carefully arrived at by calculations and estimations, are approximations and are used here only due to the lack of more accurate information.

1 [i.e. in 1937 - Analyst] 18

2 [See page 89 - Analyst]

THE OIL INDUSTRY OF THE HUNGARIAN ECONOMY

315
433
439

Compared with the world's leading producers, exporters, and importers Hungary's importance is very small indeed. As an example, her crude production during the 1940's fluctuated between one third of 1 percent and one half of 1 percent of United States production, being comparable to the output of the states of Ohio or New York. Similarly, postwar Hungarian exports are only an insignificant fraction of those of Venezuela or of the Middle East.

In oil-poor Europe, on the other hand, Hungary's position is quite different. Of all European countries Hungary stands in third place behind Romania and Austria as an oil exporter and is the fifth largest absolute producer of crude, being preceded only by Romania, Austria, West Germany, and the Netherlands. The mere fact that Hungary is self-sufficient in oil is of signal importance to the Soviet economic system. The Hungarian refining industry and even the small Hungarian surpluses of oil are important factors in the oil supply of the western reaches of the Soviet empire.

12. Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

EXPLORATIONS AND DISCOVERIES

BEFORE 1920

315
133
135

While the development of Hungary's oil industry has been greatly influenced by the political and economic developments of the last century, its very existence was determined by geologic events which occurred millions of years earlier.

Most of the area under study was dry land during the Mesozoic era, and considerable erosion took place; accordingly, oil accumulations are to be expected mainly in the abundant Tertiary formations. In the early Tertiary period the area began to sink.[1] The sinking, however, was not uniform. Some parts of the former mountain systems remained in relatively higher positions, and to the badly eroded remains of the older mountains new ones were added, formed by Tertiary volcanism. Several basins developed as a consequence of the volcanism and of the uneven sinking (which recent surveys indicate is still occurring).[2] Transgression followed the sinking, and the basins were gradually filled with Tertiary sediments, which in some places reached over ten thousand feet of thickness.[3]

The largest of the basins thus formed is the Great Hungarian Basin, which coincides with the Great Hungarian Plain. It includes most of presentday eastern Hungary, the Yugoslav province of Vojvodina and narrow strips along Romania's western and Carpatho-Ukraine's southern boundaries. The two other major basins are the Győr Basin to the northwest (divided about equally between Hungary and Czechoslovakia) and the Transylvanian Basin to the southeast (part of Romania).

1 [cf. cat. ml, p. 51 for footnote -- analyst]

EXPLORATIONS AND DISCOVERIES

315
133
135

The northeast-southwest trend of the Bakony Mountains and the Vértes and Pilis mountains separates the Györ Basin from the Great Hungarian Basin. The Györ Basin is bordered to the west and northwest by hills along the Austrian border (which include outcroppings of the submerged northeast extension of the Alps) and by the Lajta Mountains and the Little Carpathian Mountains.

Beyond the Little Carpathians is the Vienna Basin, straddling the Czechoslovak-Austrian border.

The Transylvanian Basin is limited to the east and south by the Carpathian Mountains and to the north and west by a chain of the remains of the pre-Tertiary mountain system and Tertiary volcanic hills, forming a quadrant of a circle.

Finally, a minor area having some oil-geological interest is the valley of the Iza River in northeast Romania

315
135

Exploration and exploitation before 1880, though primitive and inefficient, established the existence of oil in many parts of Hungary, and furnished leads for later explorations.

For centuries Hungarians had been aware of oil occurrences in some regions of their land. Before the recent era of intensive exploration, oil was found in the Flysch zone in the northeast in Ung and Maramureş (Máramaros) counties (see Uzhorod [Ungvár]) and the Iza River Valley.[1] Oil traces were found in the southeast corner of Transylvania in the same geological formation at Sósmezo. Asphalt-impregnated Pontian (Pliocene) sandstones occurred at Derna and Tătăraş (Tatáros), east of Oradea (Nagyvárad). Oil was found at Recsk on the northern margin of the Great Hungarian Plain, and there was a minor occurrence at Jibău (Zsibó), between the Transylvanian and Great Hungarian basins.

The earliest explorations were made in the southwest region, now part of Yugoslavia, where oil was known to occur at Selnice (Szelencze) and Peklenica (Bányavár)

1 [For footnote, cf. cat. 116, p. 51 -- Analyst]

EXPLORATIONS AND DISCOVERIES

315 [135]

in the Medjumurje (Muraköz) area, and south of the Drava River at Ludbreg, at Pogancec, and at Pitomaca; and at Ivanic and Mikleuska and Bujavica and Peklenica. Peklenica and Mikleuska were prospected around 1850.

In 1860 a plant at Anina in Transylvania began distilling oil from bituminous shales. A second plant was added in 1867, and production reached 900 to 1,000 tons of crude oil a year, distilled from 15,000 to 20,000 tons of shale. These plants were abandoned in 1882. Similar plants distilled oil and asphalt from the above-mentioned tar sands at Derna and Tătăraş. These sands contained 11 to 15 percent tar, which was washed out of the sand and then distilled. By 1906 these plants had produced 25,300 tons of oil and 45,400 tons of asphalt. The annual rate thereafter was 2,000 to 2,500 tons of oil and 4,000 to 5,000 tons of asphalt.

From 1881 to 1893 many shafts were sunk and many wells drilled near surface oil occurrences. Some shafts were 300 feet deep, and one reached 1,800 feet, but none tapped commercial oil pools.

[654]

To encourage continued exploitations in the face of these failures, the Hungarian government began in 1894 to subsidize the search for oil. By 1903, seventy thousand dollars of public funds thus invested resulted in oil production from two small pools, the first discovered at Selnice and the second at Peklenica. These small strikes called attention to the Medjumurje area, however, and a delayed return on the public investment came in the form of important oil fields later discovered on the same geological trend.

In 1907 the government ceased to subsidize private operations and began to undertake its own explorations.

655 315

Until 1911 oil resources were open to private exploitation, subject to government regulation. The same was true of natural gas.[5] But Section VI, 1911, of the Hungarian law declared a state monopoly on natural hydrocarbons: bitumen, oil, gas, tar, asphalt, and ozocerit. The law

5 [For footnote, cf. Cat. 116, pp. 51-52--Analyst]

EXPLORATIONS AND DISCOVERIES

315 [655] [471] The law[1] gave the government the right to grant concessions to individuals or private companies for limited areas and limited time periods.

In the years following, several Hungarian and foreign companies operated under this law. The first was the Hungarian Carpathian Petroleum Company, Ltd. (Magyar Kárpáti Petroleum R.T.), which acquired the Iza Valley concession. In 1911 its exploratory well No. 4 struck oil at 1,506 feet in Săcel (Izaszacsal). For some time about 100 barrels of oil flowed daily from this well. Additional wells were drilled in the vicinity, some resulting in similar oil flows.

Explorations ceased from the time the Treaty of Trianon awarded the area to Romania in 1920, and were renewed after 1940, when Hungary temporarily recovered Northern Transylvania.

Transylvanian Gas Fields

315 In 1909 a very important gas field was discovered at Sărmaş (Sármás) in Transylvania. Gas seepages and salt water springs in the vicinity prompted a detailed geological survey. However, the first well, drilled southeast of Sărmaş as a result of this survey, sought not hydrocarbons, but potash, needed in Hungary for fertilizer.

No potash was found, but the well penetrated several sand strata that yielded salt water and some gas. A stratum between 1,509 and 1,542 feet produced water containing 7 percent salt. At 2,031 feet this well was abandoned and a second started at Sărmaş, still in search of potash. Important gas shows were noticed very soon. At 300 feet a strong gas blow handicapped the drilling. At 525 feet the well blew out, and it was with considerable difficulty that drilling was resumed. At 990 feet the strong blowing of gas between the drill stem and casing made further progress practically impossible. The well could not be closed since it had been drilled for potash, and therefore the casings were not cemented, nor were the individual gas sands sealed. For two years it blew about 25 million cubic feet of gas

[1] [i.e. the oil resources law of 1911 -- Analyst]

EXPLORATIONS AND DISCOVERIES

315 daily, 99.25 percent methane and 0.75 percent nitrogen. It was then brought under control and is still furnishing gas.

[133] This discovery[1] led to a detailed geological survey of the entire Transylvanian Basin. The area of the Transylvanian Basin is nearly five million acres. The thickness of the sedimentary fill (Tertiary) is estimated to be about 15,000 feet. Pliocene is found at some places only in the center of the basin, and most of it is eroded. Miocene is represented by a 5,000-foot Sarmatian section, 6,000 feet of Upper Mediterranean (Tortonian and Helvetian) and about 3,000 feet of Lower Mediterranean (Burdigalian and Aquitanian).

Well-developed sand strata in the Sarmatian, in which about 15 gas horizons have been located, form the main reservoir of the Transylvanian gas fields. Some gas has also been found in the Tortonian.

Oligocene and Eocene (older members of the Tertiary) are known only at the eastern margin of the basin, where they rise to the surface.

In the center of the basin the Tertiary is folded into domes (brachy anticlines), badly eroded at the top. Pliocene is found only in the synclines, and 500 to 2,000 feet is eroded from the Miocene also. However, sufficient gas-bearing sand horizons separated by thick, impermeable marl strata were preserved.

The initial Sărmaş well is located on a large dome and is producing gas from Sarmatian sands covered at that point by only 11 feet of alluvium. Thirty-six such domes were mapped by the survey.

By 1919, just before Hungary lost control of Transylvania, 23 wells had been drilled into six of these domes. They had a combined potential daily production of 71.1 million cubic feet. They included ten wells at Sărmaş, yielding 45 million cubic feet daily; four at Saros, yielding 15 million cubic feet; four at Bazna, yielding 1.3 million

1 [i.e. of the important gas field at Sármás in Transylvania -- Analyst]

EXPLORATIONS AND DISCOVERIES

315 cubic feet; two at Samsund (Mezősámsond), yielding 4 million cubic feet; two at Copsa-Mică (Kiskapus) yielding 2.9 million cubic feet; and one at Zău (Mezőzáh), yielding 2.9 million cubic feet. All six domes are still producing.

Gbely (Egbell) Oil Field

Gas seepages reported in 1911 in the vicinity of Egbell (now Gbely, Czechoslovakia) led to the most important oil discovery in Hungary prior to World War I.

[133] A survey was undertaken of this part of the Vienna Basin. Geologically, the Vienna and Győr basins are similar; but the sequence of Tertiary formations in the former is more nearly complete. The Pleistocene cover impeded the survey, which was completed with the help of the torsion balance survey, invented in 1890 by a Hungarian scientist, Baron Lorand Eötvös.[6] This was the first proof of the effectiveness of his method of locating oil-bearing structures. All the present commercial oil fields in Hungary were discovered this way, and the method went into commercial use in Mexico in 1921 and in the United States two years later.[7]

A dome was outlined two miles west of Gbely and another about five miles south of that town. The first well, completed in January 1914, produced about 300,000 cubic feet of gas and 100 barrels of oil daily from the Sarmatian (Miocene) strata; subsequent drilling proved the structure to be complicated with several faults. Later two more domes of similar character were found, immediately north and northeast of Gbely.

Production in this field amounted to 77,125 barrels in 1933 and 83,971 barrels in 1934. More recent figures are available only for total Czechoslovak oil production; but from these the Gbely production from 1940 to 1950 can be estimated as: 41,000 barrels in 1940; 46,000 in 1941; 68,000 in 1942; 50,000 in 1943; 46,000 in 1944; 22,000 in 1945; 49,000 in 1946; 52,000 in 1947; 51,000 in 1948; 73,000 in 1949; and 70,000 barrels in 1950.

7 [Cf. Cat. 116, p. 52 for source -- Analyst]

EXPLORATIONS AND DISCOVERIES

315 [135]

The oil is heavy, with an asphalt base. Its gravity is 21.0° API.[8] It contains no gasoline but furnishes an excellent, high viscosity lubricating oil. Fractional distillation shows: 3.5 percent (29.7° API) distilled between 150° and 200° C.; 28.5 percent (26.4° API) between 250° and 300° C. residuum, 67.5 percent (17.0° API); asphalt content, 0.37 percent; sulphur, 0.25 percent; paraffin, none.[9]

In spite of further exploration, no additional commercial quantities of oil were found in this vicinity.

At Hodonín, north of Gbely in the Vienna Basin, is Czechoslovakia's most productive oil field. Its domes contain five oil horizons. Three are Sarmatian (Miocene); oil from the upper two is similar to Gbely oil: heavy, without gasoline and with an asphalt base. Oil from the third horizon is similar but lighter and contains some gasoline. Oil from the fourth horizon, Mediterranean (Miocene), is very much lighter; and an extremely light oil, with high gasoline content and paraffin base, comes from the fifth horizon, at about 4,900 feet in Carpathian sandstones (Flysch).

The Hodonin structures are strongly faulted. Some faults have considerable throw, and the oil produced from the Sarmatian at the downthrown side of the fault is much lighter than the oil produced at the upthrown side of the fault from a shallower depth. It contains gasoline and has a paraffin base—although it is generally believed that asphalt-based and paraffin-based oils are of differing origins.

South of Gbely, an oil discovery was reported in 1950 near Malacky. This could not, as Russian authorities have claimed,[10] be an extension of the Austrian Zistersdorf field, as the general geological strike there is north-northeast to south-southwest. If this discovery is actually a commercial oil field it is probably a dome similar to the Gbely domes.

[8] [for footnote, cf. cat. 116, p. 52 - - Analyst]

EXPLORATIONS AND DISCOVERIES

FROM 1920 TO 1948

315 Southwestern Hungary: Anglo-Persian Concession

The success of the first Gbely well in 1914 encouraged further explorations. The next year government geologists mapped several structures in southwest Hungary, between the Drava and Sava (Száva) rivers. In 1918 the first well drilled in this area, at Bujavica, produced about nine million cubic feet of gas daily, from a depth of 1,180 feet; at 1,300 feet it yielded some oil.

In 1920 this well, along with those farther north at Selnice and Peklenica, was included within the borders of Yugoslavia. But the geologists, convinced that the oil-yielding formations continued into Zala County north of the Drava, resumed their surveying in what was now the southwest corner of Hungary, between the Drava and Danube rivers.

[133] Most of this area is covered with young Pleistocene sediments which, deposited almost horizontally, veil the structure of the older formations. The results of the survey were therefore inconclusive; and the government elected to grant a concession for the region rather than gamble on an exploratory drilling operation of its own.

In 1921 a three-year concession went to the D'Arcy Exploration Company, an affiliate of the Anglo-Persian (now Anglo-Iranian) Oil Company, Ltd. It was renewed for another three years in 1924. D'Arcy formed the Hungarian Oil Syndicate, Ltd., which sank three wells during its six-year concession without finding any commercial oil deposits.

The first well probed 5,700 feet at Budafapuszta for a continuation of the Selnice-Peklenica structure. The structure at Selnice and Peklenica can be clearly observed as a surface anticline, but there is little surface indication of the structure of Budafapuszta. The well was abandoned as a dry hole at 5,700 feet, in Lower Pannonian (Lower)

EXPLORATIONS AND DISCOVERIES

315

Pliocene), after only insignificant gas traces with oil smell had been encountered.

Although this failure discredited oil possibilities in the area for some time—exploration was not resumed until 1934—the well was only a third of a mile south of the southern margin of the Lispe oil field, discovered in 1937.

On the basis of surface geology the Hungarian Oil Syndicate then drilled near Kurd to a depth of 2,045 feet. Gas and oil traces were observed at 930 and 1,000 feet but the well was abandoned in Upper Mediterranean (Miocene).

After the renewal of its concession in 1924 and with the help of some Hungarian capital, the syndicate tried a third well just east of the Danube at Baja on a geophysical prospect. Here, as at well No. 1, the Pliocene strata are of great thickness. The base of the Lower Pannonian is at 4,207 feet. Only minor gas shows had been observed when drilling ceased at 4,491 feet.

The inflation in Hungary all but wiped out a Ł 120,000 exploration fund, which had been converted into Hungarian money. This capped the drilling failures, and the syndicate pulled out of Hungary.

Northeastern Hungary: Bükkszék Oil Field

While the ill-fated British concern prospected western Hungary, the government initiated exploratory operations of its own east of the Danube, sinking a number of wells in the northern part of the Great Hungarian Basin. For a time this venture seemed equally fruitless, but it finally resulted in the discovery of the Bükkszék oil field.

In 1924 a torsion balance survey led to two wells being drilled at Hajduszoboszl. The first went down 3,560 feet without getting past Upper Pannonian (Upper Pliocene). It yields large quantities of hot water (163° F.) and 130,000 cubic feet of gas daily. The second well, only 700 feet from

EXPLORATIONS AND DISCOVERIES

●315 the first, went much deeper, to 6,630 feet. Again hot water, some oil traces, and 120,000 cubic feet of gas daily resulted. The geologic log of this well is: 2 feet of Holocene; 2 to 412 feet, Pleistocene; 412 to 3,620 feet, Upper Pannonion (Upper Pliocene); 3,620 to 4,640, Lower Pannonion (Lower Pliocene); 4,640 to about 4,710, Sarmatian (Miocene); and from about 4,710 to 6,630, possibly partly Triassic.

Wells at nearby Debrecen and at Karcag and Tiszaörs were also failures, yielding only hot water and some gas. A 6,010-foot test farther north at Tard encountered bitumen and oil traces in many horizons of the Miocene and Oligocene strata, but was abandoned in Triassic directly underlying the Lower Oligocene (Ligurian). Many significant unconformities were observed in the Tertiary, and all the Mesozoic strata above Triassic were absent.

Oil traces in springs and excavations then prompted a survey in the vicinity of Bükkszék. It revealed the presence of a strongly faulted structure, supposedly an anticline resulting from pre-Miocene folding followed by severe erosion. The eroded structure was covered by transgressing Miocene sediments and again folded; later the whole complex was fractured by intense faulting. Porous volcanic tuffs—good reservoirs for the accumulation of oil—are interbedded in the Oligocene clays."[1]

The first Bükkszék well, drilled in 1937, encountered such tuffs at 1,100 feet. They yielded two barrels of oil a day. It is a paraffin-based oil, fractionalizing into 8 percent light gasoline (66.5° API); 9 percent heavy gasoline (52.5° API); 15 percent kerosene (40.0 °API); 28 percent motor oil (36.5° API); and 40 percent residuum.

Many more wells followed, at depths varying from 300 feet to 3,000 feet. Production was 7,979 barrels in 1937; 43,068 barrels in 1938; 15,062 barrels in 1939; 6,409 barrels in 1940; 3,722 barrels in 1941; 3,221 in 1942; 2,666 in 1943; 1,440 in 1944; 1,567 in 1945; 1,735 in 1946; and 1,500 barrels in 1947. Estimated production was 1,300 barrels in 1948 and the same in 1949, and 1,500

[1] [Cf. cat. 116, pp. 52-53 for source -- Analyst]

EXPLORATIONS AND DISCOVERIES

315●

barrels in 1950. This would make the total yield of the field some 92,500 barrels to the end of 1950.

Production at Bükkszék is continued at a financial loss. If the profit motive were decisive, extractive operations would have ended years ago.

Other government wells in the northern part of the Great Hungarian Plain were all failures, though many good oil shows were encountered.

Western Hungary: Standard Oil Concession, 1933-1948

[411]

It has been noted that the Anglo-Persian affiliate's departure from western Hungary was occasioned more by inflation than by disillusionment with the area's oil potential. In 1933 the government granted a new five-year concession to all of Hungary west of the Danube—some eight million acres.

Concessionaire was an American firm, the European Gas and Electric Company (Eurogasco). Incorporated in Delaware, this firm began negotiating in 1931 for oil and natural gas concessions in Czechoslovakia, Austria, Yugoslavia, and Hungary. In 1933 the Standard Oil Company (N.J.) acquired an interest in Eurogasco; by 1939 it owned more than 90 percent of the company's stock.

In an agreement signed 8 June 1933 and approved by the Hungarian Parliament 28 June 1933, Eurogasco pledged to spend at least $300,000 prospecting its concession and to sink at least eight wells.[12] Hungary's royalty was to be 15 percent on oil and 12 percent on natural gas.[13]

The agreement was extended for two years on 10 June 1937; and when Eurogasco struck oil an exploiting company, the Hungarian-American Oil Industrial Company (Magyar-Amerikai Olajipari R.T.), known as MAORT, obtained a forty-year concession to the region on 6 July 1938. Ten years later MAORT was expropriated by Hungary's communist government.[14]

2 [for footnote, cf. cat. 116, 31 p. 53 -- Analyst]
3 [cf. cat. 116, p. 53 for source -- Analyst]

EXPLORATIONS AND DISCOVERIES

315 Initial Explorations:

The same geologic problems that had made the initial government survey of western Hungary indecisive and that had resulted in Anglo-Persian drilling three wells without finding oil now confronted Eurogasco. Most of the region is overlaid with recent sediments, horizontal, or nearly so, except in the vicinity of Mesozoic mountains. Individual strata can be followed only for short distances; and cross-bedding makes the dubious data of surface geology even more unreliable. Moreover, no oil or gas seepages were known in the area.

To overcome these problems Eurogasco launched an intensive geophysical campaign.

[133] Aside from the Hungarian part of the Győr Basin, which is flat, and the Bakony, Vértes, Pilis, Velence, Mecsek, and Villány mountains, western Hungary is hilly; and hills interfere with the torsion balance survey. Time-consuming land-surveying operations and long computations are required to compensate for the effect topographic relief has on torsion balance readings. The Eurogasco survey was made with exceptional care, however, and proved quite successful in detecting and outlining subsurface structures.[15] About 20,000 torsion balance stations were set up before this method was made obsolete in 1940 by the newer gravity meter survey, which has fewer topographic limitations. By 1943 some 12,000 of the latter stations had been made.

Besides these gravity methods, the most common geophysical methods used in oil prospecting are seismographic(reflection and refraction) and magnetic methods. All are indirect since they indicate not the presence of oil itself, but geological structures favorable to oil and natural gas accumulation. By 1943 the gravity anomalies had been checked with the reflection seismic method. Seismograms were recorded at about 2,500 shot points, and a magnometer survey of 15,000 stations furnished additional information.

† [cf. cat. 116, p. 54 for source -- Analyst]

EXPLORATIONS AND DISCOVERIES

3/5 •

The Győr Basin was the scene of Eurogasco's first drilling operation. The torsion survey outlined the Mihályi structure, a 35-mile-long buried hill structure of strongly faulted crystalline (quartzite and phyllite), probably Paleozoic. It has three secondary highs on its north-northeast to south-southwest striking crest. All three highs were drilled.

Five wells, in all, went down into the Mihályi structure without any commercial oil accumulation being found. The first well, however, tapped a carbon dioxide reservoir. Drilled over the center high, near the village of Mihályi, it encountered the crystalline basement at 5,256 feet, directly underlying Pannonian (Pliocene) strata. It yielded 15 million cubic feet of carbon dioxide daily, along with a 5 percent distillate from Lower Pannonian sands between 4,990 and 5,000 feet. A small plant was built to utilize the gas in producing about ten metric tons of dry ice daily.[16]

The second well, four miles to the north-northeast, reached the basement at 8,095 feet; and the third well, midway between the first two, hit bottom at 6,227 feet. Neither penetrated beds older than Pliocene above the crystalline basement, and both were dry holes.

The fourth well, another dry hole, seventeen miles north-northeast of Mihályi on the northern secondary high, passed through a 285-foot section of Miocene formation before hitting the crystalline basement at 8,698 feet.

The fifth well reached the basement at 4,790 feet. It was drilled about nine miles southeast of the first well. It has essentially the same geological log as the first well, also yielding much carbon dioxide with 5 percent hydrocarbons.

The origin of this gas is the subject of speculation. The gravity data indicate the buried crystalline hill is dissected with major strike and cross faults. Gravity

[illegible], ch. cat. 116, p. 54 -- Analyst

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

• 315

and magnetic data indicate that basic igneous masses rose and intruded through these faults into the overlying Tertiary sediments. Small extinct basalt volcanoes from the late Tertiary are found farther southeast, around Lake Balaton, in the Bakony Mountains, and even west of them. Moreover, basaltic tuffs are found at the surface southeast of Mihályi and also in the cores and cuttings recovered from the Mihályi well and from nearby artesian wells. These facts suggest basalt or gabbro intrusions (depending on their depth below the contemporary surface and on the rocks they intruded) on the faults of the Mihályi structure. It may be concluded that the carbon dioxide migrated upward through the major faults or was brought up by the basalt intrusions.

Gravity data indicate another buried hill structure at Nagylózs, west of Mihályi, which is probably similar to the Mihályi structure. Because its crest is undoubtedly nearer the surface than the Mihályi crest, it was not considered an oil prospect and was not drilled.

Eurogasco moved next toward the Yugoslav border, in the southwest part of the Great Hungarian Basin. The second structure tested was Görgeteg, a 20-mile, north-south striking structure located by the torsion balance survey. Three wells produced oil and gas traces but no commercial oil accumulations.

Gravity data were interpreted as indicating an anticline with gently dipping west-east flanks and with a structural terrace on the east. Seismographic data, however, indicated only southwest-dipping strata. A deep-seated basement horst covered by southwest-dipping sedimentary strata may explain this discrepancy.

Mechanical difficulties halted the first well at 6,755 feet. The first 1,234 feet were Quaternary, from 1,234 to 4,600 feet, Levantinian and Upper Pannonian. The rest was Lower Pannonian. Many horizons showed oil and gas traces, but the lower half of the well passed mainly through hard, compact, and very dense marls that could not serve as an oil reservoir.

EXPLORATIONS AND DISCOVERIES

315 ●

Later wells went down north and south of the first. No. 2 plumbed 7,078 feet into Lower Pannonian. After 1,339 feet of Quaternary, its log showed Levantinian and Upper Pannonian to 4,757 feet. No. 3 showed 170 feet of Quaternary; 170 to 1,896 feet, Levantinian; 1,896 to 4,432, Upper Pannonian; 4,432 to 6,814, Lower Pannonian; and from 6,814 to where drilling ended at 7,441 feet, Upper Mediterranean (Miocene). No more wells were drilled on this structure.

Next drilled was the Inke structure northwest of Görgeteg. It is the first of a trend of four buried hills revealed by the gravity survey along a line parallel to Lake Balaton. The others are the Igal structure and the Pincehely and Németkér structures. They lie in a belt of low gravity values in a structural trough, making their location favorable for the accumulation of oil.

The Inke structure has a triangular gravity maximum, indicating a faulted block. The Eurogasco prospectors hoped that an arch had developed in the Tertiary formations above this Mesozoic and/or crystalline horst. They located the first test well at about the center of the gravity maximum. It tapped considerable gas but no commercial oil.

The well penetrated over 4,000 feet of Pliocene before striking Miocene (Upper Mediterranean) at 4,744 feet. Drilling ceased at 7,023 feet, still in Miocene. Lower Pannonian sands between 4,429 and 4,462 feet, and again between 4,488 and 4,521 feet, yield over three million cubic feet of gas daily. It contains over 30 percent carbon dioxide, along with some 43.6° API distillate. The latter is of paraffin base—77 percent kerosene, plus some gasoline and motor oil.

A magnetic survey indicated a basic igneous dike at the southeast side of the Inke structure, making the geologic character of this faulted buried hill essentially the same as at Mihályi. The gas may therefore be of similar origin.

Five more wells were drilled without success.

EXPLORATIONS AND DISCOVERIES

315 The deepest one, when abandoned at 7,853 feet, was still in Pliocene. This means that a Miocene structure exists here with a closure of over 2,000 feet.

The discovery of oil in commercial quantities at Surd, a small village over the southwestern part of the Inke structure, was reported recently. The report, which gave no data on the quantity of production, has not been confirmed. It may be correct, however, in view of the above-discussed geological conditions.

Zala Oil Fields:

Tests at Eurogasco's fourth exploratory site—Budafapuszta in Zala County where previous Anglo-Persian tests had found no oil—brought home the first important commercial oil wells within the post-Trianon borders of Hungary.

The earlier drilling had sought a continuation of the oil-bearing Selnice and Peklenica structures. Eurogasco surveyed this area with the torsion balance and later with the gravity meter. The gravity data indicated a twenty-mile east-west striking gravity maximum. The width of this maximum from minimum to minimum is eight miles at the eastern end and about fifteen miles at the western end at the Yugoslav border. It contains three secondary highs at Lispe, Lovászi, and Lendvaújfalu (usually abbreviated to Újfalu). The larger gravity maximum was interpreted as an extension of the Selnice anticline, and the secondary gravity maxima as indications of three domes on the crest of the main Budafapuszta anticline. Subsequent drilling proved this interpretation correct; oil production was obtained from all three domes.

The torsion survey, which actually located the oil fields, was accomplished at a cost of about two thousand dollars. This is the most efficient geophysical survey on record. It was made by Hungarian experts using instruments manufactured in Hungary.[17] 1

The first well went down near the small village of Lispe, about a mile north of the old Anglo-Persian test

1 [Cf. cat. 116, p. 54 for source -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC.1 Hungary EC.1

315

well, in March 1937. It passed 3,510 feet of Upper Pannonian then Lower Pannonian to a depth of 5,069 feet. From that point to the end of drilling at 5,755 feet was Sarmatian. The well caved in below 3,724 feet, however, and only strata above that depth could be tested. A Pliocene sand between 3,474 and 3,546 feet produced about 20 million cubic feet of wet gas daily, plus a few barrels of oil. Gasoline content of the gas is three quarts per thousand cubic feet of gas.

The cave-in prevented completion of this well as an oil producer, and a second was drilled a half mile to the east-southeast in the fall of 1937. It logged 2,930 feet of Upper Pannonian; 2,930 to 4,997 feet, Lower Pannonian; and thereafter Sarmatian to the end of drilling, 5,909 feet. It yielded 365 barrels of oil and 360,000 cubic feet of wet gas daily from sands between 3,851 and 3,967 feet. It is a light oil with paraffin base, averaging 38° API, with a 26 to 34 percent gasoline content and 0.15 percent sulphur.

The samples and cores of these two wells indicate a continuous geological section without any noticeable unconformity. It appears that deposition of Tertiary sediments in the Budafapuszta area was continuous at least since the middle of Sarmatian time.

Production developed rapidly in the Lispe oil field. It contained 106 productive wells by the end of 1943. The productive area was 2,330 acres and the area of the gas cap 641 acres. By the end of 1941 the field had produced 5,505,115 barrels of oil and 8,306 million cubic feet of gas. Production of barrels of oil and million cubic feet of gas, respectively, was 2,189,405 and 3,452 in 1941; 2,297,808 and 3,779 in 1942; 2,022,600 and 3,975 in 1943; 1,709,559 and 3,801 in 1944; 1,540,460 and 4,010 in 1945; 1,562,712 and 4,507 in 1946; 1,235,554 and 3,700 in 1947; and 1,097,000 barrels of oil and 4,000 million cubic feet of gas in 1948, the last year when reliable estimates were made. Total production by the end of 1948 was 16,971,000 barrels of oil and 36 billion cubic feet of gas. Available figures show oil production at 1,050,000 barrels in 1949, 1,100,000 in 1950, and 1,050,000 in 1951, for a total production of 20,171,000 barrels.

EXPLORATIONS AND DISCOVERIES

●315 By 1948 the number of productive wells had fallen to 78. Only 35 of these were free-flowing; oil had to be gas-lifted or pumped from the others. (At first all Lispe wells had been free-flowing.) By 1951 few wells flowed freely.

The initial recoverable reserve of the Lispe oil field had been estimated at about 30 million barrels. By the end of 1952 about 21 million barrels had been produced. However, because of the present policy of intensive production, the ultimate recovery may fall short of 30 million barrels, unless some effective secondary recovery methods are used in this oil field.

The first well drilled on the Lovászi structure in 1940 yielded commercial oil, and this field was also rapidly developed. The producing area covers 2,551 acres with a 310-acre gas cap, yielding oil and gas from Pliocene strata between 4,000 and 5,000 feet. Production was 21,160 barrels of oil and 72 million cubic feet of gas in 1940; 1,064,707 and 1,371 in 1941; 2,619,493 and 3,700 in 1942; 3,838,363 and 5,330 in 1943; 3,810,114 and 7,059 in 1944; 3,122,498 and 8,767 in 1945; 3,029,931 and 9,963 in 1946; 2,625,151 and 9,444 in 1947; and 2,145,593 and 7,294 in 1948. Total production by the end of 1948 was 22,277,000 barrels of oil and 53 billion cubic feet of gas. Estimated oil production thereafter was 2,123,000 barrels in 1949, 2,000,000 in 1950, and 2,000,000 again in 1951, for a total of 28,400,000 barrels. Estimated initial recoverable reserve of this field was 35 million barrels.

The Lovászi oil is light, with high gasoline content. Its gravity is 42° API. Otherwise it is similar in character to the Lispe oil.

In 1941 a well was drilled in the third dome of the Budafapuszta structure, near the village of Újfalu. It produced 75 barrels of very heavy black oil daily from Pliocene sands between 2,018 and 2,037 feet, and 300,000 cubic feet of wet gas from Miocene sands between 4,078 and 4,101 feet. The dome has an oil productive area of 86 acres and a gas area of 135 acres. Only five wells were drilled. Oil production was 4,865 barrels in 1941, 3,377

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

barrels in 1942, and 4,791 barrels in 1943. Production in 1944 was only 329 barrels, and the field was abandoned after having yielded 13,362 barrels of oil. Initial recoverable reserve had been estimated at 25,000 barrels. In 1942 gas production was seven million cubic feet, and another one million was produced in 1943. No estimate could be given on the gas reserves in the Miocene sands.

MAORT, the exploiting company that supplanted Eurogasco after the latter had uncovered commercial oil at Lispe, first installed a short pipeline connecting the Lispe and Lovászi fields with a nearby railroad line, from which the oil was shipped to refineries in tank cars. In 1941 MAORT completed an 8-inch pipeline from the fields to Budapest, and then added 6-inch and 4-inch laterals to refineries at Almásfüzitő and Szöny on the Danube and at Pét on the northeast shore of Lake Balaton.

Combination absorption and pressure maintenance plants were constructed in the Lispe and Lovászi oil fields, each with a capacity of 20,000 gallons of casing-head gasoline daily and the same amount of liquid gas. The Lispe plant also included compressor units to return superfluous gas to formation.

North of the Budafapuszta anticline the gravity anomalies indicated another east-west striking structure through Hahót. The fifth well drilled on this structure, in 1942, proved a producer. It hit Triassic limestones at 4,690 feet, below 15 feet of porous Miocene limestones. Pliocene lies on Tortonian limestones, and there is a distinct unconformity between the Pliocene and Miocene. Oil production is from the porous Miocene limestones and from the fissures and crevices of the karst-type Triassic limestones.

The Hahót structure is a west-plunging buried hill of Triassic limestone horst, cut by cross-faults and covered with Tertiary strata in the form of a gentle arc. The oil probably originated in Pliocene marls leaning against the side of the buried hill and migrated into the crevices of the Triassic and Miocene limestones. Although some

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

● 315

gas is produced with the oil, it is believed that water is the main producing force.

Six additional productive wells were drilled around the discovery well on a circle of 2,000-foot diameter. The proved producing area is 145 acres. Production in 1942 was 196,477 barrels of oil and 34 million cubic feet of gas; 559,964 and 92 in 1943; 684,063 and 112 in 1944; 356,171 and 59 in 1945; 552,699 and 87 in 1946; 468,660 and 63 in 1947; and 337,000 and 53 in 1948. Total production by the end of 1948 was 3,155,000 barrels of oil and 500 million cubic feet of gas.

Although many more wells were drilled on this structure, only two, sunk in 1948 and 1949 about two miles east of the Hahót field, yielded oil—7 barrels a day from one, and 20 barrels, with an increasing amount of water, from the other. Approximate Hahót production of oil was 300,000 barrels in 1949, 350,000 barrels in 1950, and 300,000 in 1951, for a total yield of 4,105,000 barrels by the end of 1951. The Hahót oil has a gravity of 30° API, considerably heavier than the Lovászi and Lispe oil. It is piped to the main pipeline at Lispe.

The gas from this field contains considerable carbon dioxide, resulting either from volcanic activity or from upward migration through the major faults of the Triassic horst. The magnetometer survey indicated the presence of several basic igneous masses in the vicinity of the Hahót field. A well drilled into one of these magnetic maxima reached hornblende-diorite-porphyry.

The Ederics gas field, located in 1947 on the Hahót structure about two miles west of the oil field, yields gas from Pliocene sands between 4,592 and 4,920 feet. It contains practically no carbon dioxide, strengthening the assumption that the carbon dioxide from the Hahót oil wells originated from great depths and is sealed off from the higher-lying Pliocene sands by the thick, compact Pliocene marls overlying the Miocene limestones.

Four wells were drilled. All yielded gas. Wells

EXPLORATIONS AND DISCOVERIES

3150

previously drilled for oil and abandoned as dry holes were reopened, and five of them were completed as gas wells. Initial capacity production of these nine wells, lying in an area of approximately 1,200 acres, is about 27 million cubic feet of wet gas daily, with a gallon of gasoline per thousand cubic feet of gas. The northern limit of this field has not yet been established, and it was hoped that the gas occurrence would be connected with an oil pool. A pipeline was built from the Hahót oil fields to Lispe to connect this oil field with the main pipeline.

Subsequent Explorations:

The Lispe, Lovászi, Újfalu, and Hahót fields—often grouped as the Zala oil fields since all four are in Zala County—were the only productive commercial results of MAORT's activities. However, the company drilled several more wells and continued its surveys. The following account of these further exploratory operations provides the best available information on oil prospects in western Hungary.

The Bakony Mountains consist mostly of intensely faulted Mesozoic limestones. Submerged formations that continue to the southwest connect this range with the Alps. One of these submerged blocks forms a northwest-southeast striking, spurlike feature at Olaszka and Nagytilaj.

The westernmost part of the subsurface continuation of the Bakony Mountains indicated by the gravity survey is the Salomvár structure, north of the Zala fields. The seismographic survey showed only southwest-dipping strata and no formal structures—a still-unexplained geological contradiction. Despite this, a well was sent down. It reached Mesozoic limestones at 7,224 feet directly under 331 feet of Miocene limestones. A good oil show was recorded in the latter. The drilling established that the Salomvár structure is a Mesozoic horst similar to the Hahót structure, where Miocene limestones form part of the productive horizon. This encouraged the drilling of a second well, north of the first, in 1946. Equipment short-

EXPLORATIONS AND DISCOVERIES

• 315 ages hindered this test, which was abandoned at 5,748 feet. A third well showed a somewhat higher structure than the first. Only gas shows were encountered, however, and, at 6,572 feet, the area was abandoned, temporarily at least. In 1951 some news leaked out of Hungary concerning a discovery at Nagylengyel, ten miles southeast of Salomvár. This location is at the southeast slope of the Salomvár gravity maximum and, on the basis of gravity data, not a favorable location. However, since the seismographic survey gave a different picture of the area's geology, an oil accumulation may have been found at Nagylengyel—though a major discovery there seems improbable. Further developments may be expected on the Salomvár structure itself.

Farther north, the torsion balance survey indicated a small east-west striking structure at Nádasd. It was regarded as the gravity indication of an anticline. A seismographic survey also showed an east-west striking structure, and in December 1947 a test well was drilled to 5,361 feet. No details are available on the tests, but the well was abandoned as a dry hole.

Artesian wells drilled along the south shore of Lake Balaton show that the crystalline basement is only a few hundred feet below the surface. Gravity anomalies recorded farther south indicate the basement has a general southern dip, and this south-dipping monocline is interrupted by two major faults approximately paralleling the lake. One goes through Balatonendréd, Lepsény, and Polgárdi at the northeast end of the lake; the other strikes through Marcali, Öreglak, Karád, Tab, and Felsönyék, south of the lake. The downthrown sides of these faults are to the southeast and south, respectively. The throw of the fault at Marcali is at least 3,000 feet. Toward the east the fault becomes shallower and its throw decreases. At Polgárdi the throw of the other fault, as computed from gravity anomalies, is about 1,500 feet, and it appears to be close to the surface.

Gravity readings indicated structures at Nagyberény and Szabadhidvég on the upthrown side of the east-

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

315

ern end of the Marcali-Felsönyék fault. The seismographic survey, although it did not give conclusive results, indicated some kind of structural disturbance in this area. Available data are insufficient to evaluate properly the importance of these prospects.

Paralleling this fault on its downthrown side, south of Marcali, Öreglak, and Karád, is a deep trough containing four major buried hill structures: at Inke, Igal, Pincehely, and Németkér. Eurogasco explorations of the Inke hill have been described previously. The Igal dome was also drilled, since the productive Hahót field was situated on a similar buried hill.

The Igal structure was indicated by gravity anomalies and by seismographic surveys. A test well penetrated 39 feet of Pleistocene; then Upper Pannonian to 2,063 feet; then Tortonian to 2,100 feet; then 12 feet of a tuffaceous sand, probably Tertiary; and finally 23 feet of probably Triassic strata, to the end of drilling at 2,135 feet. The thin Miocene layer overlying the Mesozoic resembles the Hahót formation, but no oil or gas production resulted. A second well three miles south of Igal, at the south flank of the structure, showed 49 feet of Pleistocene; then Upper Pannonian to 3,209 feet; then Lower Pannonian to 4,340 feet; Sarmatian to 4,550 feet; Tortonian to 4,582 feet; Helvetian to 4,977 feet; and drilling ceased two feet lower in tuffaceous sandstones and conglomerates directly underlying Miocene schlieren facies. This well had some oil shows in Pliocene marls and Miocene conglomerates.

East-northeast of Igal, at Pincehely, the gravity anomalies indicated a sharp, angular subsurface structure, probably a very shallow buried hill outlined by major faults of considerable throw. The basement—Mesozoic or older—is estimated to be only a few hundred feet below the surface. Magnetic data suggest it consists of nonmagnetic rocks, probably limestones.

The Németkér structure is east of Pincehely and deeper lying—about 1,600 feet, according to seismographic data. It extends east across the Danube; a gravity maxi-

EXPLORATIONS AND DISCOVERIES

● 315

mum was found south of Solt, outside the MAORT concession.

South of Igal, gravity anomalies showed a west-plunging structure with some closure near Kaposvár. A test well drilled west of Kaposvár encountered phyllite at 3,730 feet under Upper Pannonian strata but no oil or gas shows.

West of the Kaposvár structure, a small gravity maximum at Kutas indicates a minor subsurface horst which has not been drilled.

East of Kaposvár, the gravity survey indicated an east-northeast to west-southwest striking structure near Döbrököz and Kurd, interpreted as a basement high. It contains considerable volcanic material, especially in the eastern part, according to magnetic anomalies. No test well was drilled on this structure by MAORT.

East of Kurd, the gravity meter found the Murga structure, probably similar in structure except perhaps for an absence of volcanic material.

The area between the Kurd-Kaposvár latitude and the Mecsek Mountains is not considered favorable for oil prospecting. Remainders of the Variscan Mountain system, granite and other igneous masses, are probably in a shallow depth north and northeast of the Mecsek. The Mecsek Mountains consist mainly of Mesozoic limestones, probably with igneous (perhaps granite) core. Fazekasboda Mountain on the eastern rim of the Mecsek is granite. The basement is generally relatively shallow, west of a zigzag fault line running between these mountains and the Villany Mountains, where it rises above the surface. Narrow, shallow horsts interchange with deep grabens in an intricate pattern, according to the gravity anomalies. South of the Villany Mountains, at Harkány, there is an oil show in the mineral water. The structure there is related to a major fault on the north side of a basement uplift. An anticline observed at the surface north of Mohács, on the Danube, and a structure indicated at Udvar, south of Mohács,

EXPLORATIONS AND DISCOVERIES

both may prove to be of practical importance. 315 [133]

The Velence Mountains east of the Bakony range are of granite and probably a remainder of the Variscan system. To their southeast, gravity and magnetic anomalies are rather irregular and characteristic of intra-basement masses. This indicates relatively shallow crystalline rocks of varying density and magnetic susceptibility, rather than sedimentary structures. Gravity anomalies indicate a relatively narrow trough between the mountains and the Danube. It is probably filled with sediments. Gravity maxima at Baracska and south of Adony may indicate productive structures.

Southeastern Hungary: German Concession, 1940-1944

In 1940 the Hungarian government granted a German concern the oil and gas concession of the southeast quarter of Hungary—east of the Danube and roughly south of parallel 47. The concessionaire, the Hungarian-German Mineral Oil Company (Magyar-Német Ásványolajipari Társaság R.T., or MANAT), was owned in equal parts by four German firms: Gewerkschaft Elwerath, Hannover; Deutsche Erdöl AG, Berlin; Preussische Bewerks-und Hütten AG, Berlin; and Wintershall AG, Kassel. The last-mentioned firm was in charge of explorations. [471]

The MANAT contract was similar to MAORT's but contained an added paragraph extending the concession to cover certain areas held by Hungary before World War I, if and when Hungary recovered them. MANAT's concession was subsequently extended under this paragraph to include two parts of Yugoslavia obtained by Hungary in 1941: the area (bordered by the Tisza and Drava rivers and by the Trianon boundary), including Bachka east of the Danube and Baranya west of the Danube; and a strip straddling the Mura River west of Zala County.

The German government subsidized exploratory drilling to the extent of RM 2,979,487.74 in the original concession and RM 1,975,182.13 in the Yugoslav areas.

EXPLORATIONS AND DISCOVERIES

• 315 These funds were to be repaid out of achieved production. MANAT obtained production only along the Mura River; refunds of RM 706,789.59 were made on the Yugoslav subsidy.[18] MANAT's total expenditure was estimated at about forty million pengös (over five million dollars).

Like MAORT, MANAT carried out intensive geophysical investigations of its concession. Torsion balance and gravity meter surveys covered almost the entire area, and the most important gravity anomalies were checked by seismographic surveys. However, its geophysical explorations were less systematic than MAORT's. This may be explained by the war-inspired pressure to find oil as quickly as possible. The torsion balance survey was made by the Baron Eötvös Geophysical Institute, a Hungarian government organization, which had already surveyed much of the Great Hungarian Plain. The gravity meter survey was carried out by German companies, using different types of instruments and different base values, each working its own locality independently of the others. There is still a discontinuity along the border lines of these surveys.

The most important geophysical prospects the surveys uncovered in southeast Hungary were: the Tótkomlós prospect and the Ferencszállás and Sándorfalva structures; the Madaras (west of Subotica [Szabadka]) and Jánoshalma structures; and the Kismarja (north of Oradea), Körösszegapáti, and Biharnagybajom structures. Sixteen exploratory wells totaling 91,090 feet were drilled on these prospects.

Gravity data indicated a subsurface structure at Tótkomlós. It was drilled to 5,312 feet, where a blowout occurred. The well blew an estimated 20 million cubic feet of gas daily from an open section of Lower Pannonian (Pliocene) between 5,092 and 5,312 feet, with a pressure of 1,920 pounds per square inch. The gas contained 51 percent carbon dioxide and 48 percent hydrocarbons. The blowout forced abandonment of the well.

A second well produced similar gas from crevices

[18] [Cf. Cat. 116, p. 54 for source. -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

3/5 ●

of hard Pliocene shales between 5,256 and 5,272 feet, with a considerable quantity of salt water and about two barrels of oil daily. A third well also was a failure.

A seismographic survey of the Tótkomlós area indicated gently north-dipping strata without closure. The occurrence of gas may result from a small fault that caused a fracturing in which the hydrocarbons accumulated. The Tótkomlós drilling assumes geological importance as the first proof of the existence of source beds in the Great Hungarian Plain.

Northeast of Tótkomlós, near the present Romanian border, the gravity survey indicated a structure near Körösszegapáti. The seismographic survey confirmed this. A test well yielded 1,750,000 cubic feet of wet gas and about half a barrel of oil daily through a 6 millimeter choke, from Lower Pannonian (Pliocene) sands and/or Sarmatian (Miocene) conglomerates at 4,650 feet. The gas contains 40 percent hydrocarbons and 60 percent carbon dioxide, and about a half gallon of gasoline per thousand cubic feet of gas. The well was reopened after World War II, in 1945 and early 1946, and, while blowing gas for a long period, produced six barrels of casing-head gasoline daily.

A second test well on the southeast flank of the structure was abandoned as a dry hole. The Lower Pannonian strata there had no porous beds that could serve as reservoirs for hydrocarbons. Two more wells on the northwest side of the structure yielded more gas. The drilling of a fifth well was interrupted by the approach of the Red Army. These wells definitely indicate a gas field.

Gravity anomalies indicated another structure northeast of Körösszegapáti at Kismarja. A well drilled at the top of the structure found the basement under Lower Pannonian strata at 3,455 feet but no oil or gas. A second well was likewise a dry hole.

Gravity meter and torsion balance surveys mapped

EXPLORATIONS AND DISCOVERIES

●315 several gravity maxima in the Szeged-Subotica area. A well drilled on the gravity maximum at Sándorfalva, northwest of Szeged, found the top of the Lower Pannonian at 5,577 feet, indicating a structural low rather than a high. It was abandoned at 6,546 feet. A seismographic survey here did not show any structure, but indicated that the basement was at 9,426 feet. The gravity maximum at Ferencszállás is probably also structurally low. A well there yielded great quantities of high-pressure artesian water from Lower Pannonian formations at 8,442 feet.

These two wells and the ones at Tótkomlós proved that the gravity method did not give as reliable information regarding the subsurface condition of the Great Hungarian Plain as it did in western Hungary. Gravity anomalies in eastern Hungary must therefore be checked with the relatively slow and expensive seismographic survey before they are drilled.

The Madaras structure west of Subotica is indicated by a very strong gravity maximum. An exploratory well found the Lower Pannonian at 394 feet and conglomerates—probably right on the basement rocks—at 987 feet. The structure is hence too shallow for oil or gas accumulation and none was found.

Other wells MANAT drilled in southeast Hungary were failures.

Recovered Area (Medjumurje), 1940-1944

On 29 December 1942 a private Hungarian company, the Mura District Mineral Oil Company (Muravedéki Ásványolajipari R.T., or MART), gained two concessions in the Mura River area recently recovered from Yugoslavia: a 67,200-acre block straddling the river (known as the Singer Concession before World War I) and an area of similar proportions farther southeast. MART sold the Singer block to an Axis combine, the Italian-German Mura District Mineral Oil Company (Olasz-Német Muravidéki Ásványolajipari R.T., or ONART). MANAT was conceded

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

315 ●

the rest of the Mura area and was the operating company for all three concessions, sinking a number of exploratory wells during World War II. MANAT did not explore its other ex-Yugoslavian concession, the Bachka-Baranya area.

On 1 May 1942—even before it acquired this concession—MANAT took control of the Selnice and Peklenica oil fields. The latter had already been drilled to capacity. MANAT send down 17 shallow holes into the Selnice field. Thirteen were productive. Encroaching salt water discouraged further drilling. A deep test well penetrated only compact sediments and not the hoped-for deeper producing formations. The two fields yielded 1,650 barrels of oil in 1942 and 1,120 barrels in 1943; 1944 production, estimated from the yield of a few months, was approximately 9,000 barrels.

The gravity anomalies of the Lovászi structure suggest that part of it extends west into the MANAT concession north of the Mura River. Of six wells drilled in search of that extension— and named the Lendava (Alsólendva) wells after a nearby town—wells A-1, A-2, A-3, and A-6 produced gas totaling, initially, about 5,800,000 cubic feet daily. It contained three quarts of gasoline per thousand cubic feet of gas. Wells A-4 and A-5 produced oil. Well A-4 yielded 4,950 barrels in the last two months of 1943 and 9,600 barrels in the first quarter of 1944. Well A-5 started to produce at the rate of about 40 barrels a day in March 1944. Allowing for a natural decline in production, the total 1944 yield of both wells may be estimated at 40,000 barrels.

Yugoslavia recovered the Mura area the following year. In 1949 twelve rigs were reportedly working in the vicinity of Lendava. The great waste of gas resulting from this type of production will probably reduce the final recovery of the Lovászi field.

Seeking a similar western extension of the Újfalu field, MANAT drilled two wells between it and Bányavár, at Muraerdo. Both wells drilled were unsuccessful since

• 315

only water was found in the formations, which produce at Ujfalu.

About midway between Selnice and Lovászi the gravity anomalies indicated a small structural terrace or closure at Petesháza in the MART-ONART concession. A test well penetrated two oil sands between 5,472 and 5,600 feet and produced about 75 barrels of oil daily, with 10 percent water. From August 1943 through March 1944 this well produced 14,650 barrels of oil. Three more wells were drilled at Petesháza, and another two went down at the eastern end of the structure, at Lendvarét in MANAT's concession. All five were producers. No production data are available, however.

Two wells were also drilled in a large structure indicated by gravity anomalies about ten miles northwest of Selnice. They met the basement near the surface.

This was the extent of MANAT's activities here before the return of the area to Yugoslavia. According to confidental reports two new Yugoslav oil fields, Gojlo and Sumecani, were discovered in the area between 30 and 60 miles south-southeast of Zagreb. A third field, Mramor Brdo, was discovered here early in 1949. According to the same source the proven area in 1950 was 250 acres and wells yielding 150 barrels each, daily, are producing from a depth of 3,000 feet.

RECENT DEVELOPMENTS

Western Hungary

315 ●
[727]

Due to the rapid collapse of the German defense system in March 1945, the Zala fields were relatively intact when the Red Army reached them. The gasoline and repressuring plants at Lispe and Lovászi, however, damaged by air raids, had not been completely repaired, and the pipelines were also broken in several places. The Red Army immediately began reconstruction using forced labor.

In August 1945 the MAORT properties were theoretically returned to their American owners, but the Russians did not permit the American directors to return to Hungary until several months later.

In spite of strong protests by the American Military Mission in Hungary, and later by the State Department, the Russians retained control of the fields until February 1947, when the Hungarian peace treaty was signed, using MAORT oil without paying for it; further, they removed trucks, drilling equipment, and even telephone wires from the oil fields.

[471]

Since all German assets in Hungary were ceded to Russia under the Potsdam agreement, they also sought strenuously, though unsuccessfully, to establish that Germans had obtained an interest in MAORT during the war. They also sought to bankrupt the company by fixing ridiculously low prices in violation of the 1933 Eurogasco contract, paragraph 2 of which provided that failing agreement between the government and the company (as to the price of the oil), "the selling price of the above-mentioned crude oil shall be the market price corresponding to the

RECENT DEVELOPMENTS

315 natural level of prices at the time."[1] Between June 1945 and July 1946, the artificially fixed prices ranged from eighty-one cents to less than one cent per barrel. It is significant to note that Article 28 of the contract provided for cancellation of the concession in the event of bankruptcy

This effort also failed, however, and with the signing of the peace treaty Russian military representatives disappeared from the oil fields and MAORT resumed near-normal operations.

315
661
471

In May 1947 the Communist Party, backed by the Red Army, ousted the non-communist government and took over the country. A three-year plan was announced for all branches of industry. The government purged most of the reliable MAORT employees early in 1948, on various pretexts, and in May it appointed a communist "controller" for the company. All Hungarian-owned industries had been nationalized without compensation in April. The following September two American directors of MAORT were imprisoned on charges of sabotaging the Three-Year Plan, along with the former Hungarian manager and key employees. The Americans were released after having been forced to sign confessions; the Hungarians were given long prison sentences. In September 1948, MAORT was confiscated.

475
315
465

The government allowed some technical directors to retain their posts but appointed a number of new directors to manage what had been MAORT operations. One of this group's first moves was to put a battalion of Hungarian secret police on the company payroll, to guard the property and to watch the employees. In 1949 most company offices were moved from Budapest to Nagykanizsa, about 20 miles from the Zala fields. The new directors also fixed long hours at low wages for the employees. In 1950 monthly wages for common laborers were 300 forints; office employees, 400-800 forints; skilled laborers and drivers, 500-900 forints; section head and technicians 800-1600 forints; engineers, 1,200-3,200 forints. Even at the official exchange rate of 12 forints per dollar these were low wages, and the actual rate in 1950 was nearer 36 forints per dollar. Moreover, up to 30 percent

[1] [for footnote, cf cat. 116, p. 73 -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

is deducted from these earnings for such items as "voluntary" subscriptions to state loans, newspapers, cultural associations, union dues, and "Korea fighters."

At the end of 1950 the communist authorities decided to reorganize MAORT after the Soviet pattern. The move, put into effect in June 1951, created the National Carbon Dioxide Producing Company at Mihályi; the National Pipeline Company, the National Mineral Oil Machine Repair Company and other, smaller groups, as well as the National Transdanubian Oil Company (Dunántuli Kőolajtermelő Vállalat), all with headquarters at Nagykanizsa.

The last-mentioned company included the Lovászi, Lispe, and Hahót-Ederics fields, as well as gasoline, propanebutane, natural gas, and carbon black plants. According to some sources it was later divided into two branches, one covering production and the other exploration. Soon after the reorganization, Hungary's economic czar Zoltan Vas, ordered all its administrative and technical offices moved from Nagykanizsa to the oil fields. It appears that the supervision of production and part of the exploratory activities are located at the fields themselves, while all the auxiliary branches, such as equipment repairing and pipeline construction, have their headquarters at the nearby town of Nagykanizsa, which is being developed as an oil center.

The geophysical division of MAORT was merged into the government's Geophysical Institute (Eötvös Loránt Geophizikai Intézet) which takes care of all the geophysical exploration in Hungary, including the Hungarian-Soviet Oil Company (Magyar-Soviet Olajipari R.T.), or Maszovol, concessions east of the Danube. According to a reliable report, the headquarters of the Geophysical Institute are located in Budapest at 14 Voroshilov Rd., and its activities in the spring of 1952 in western Hungary included exploratory drilling and geological surveying at Tatabánya, Keszthely, Zalaegerszeg, and Fertőszentmiklós using Hungarian and German equipment. Some Russian geologists joined the geological group at Nagykanizsa to help the Hungarians find new oil fields. There were also per-

RECENT DEVELOPMENTS

315 sistent rumors of the presence of Romanian oil experts both at the oil fields at Lispe and at Nagykanizsa; a recent eyewitness account describes the arrest of six Romanian oil experts at Lispe in December 1952 and the closing of the "Romanian Office" at Nagykanizsa in January 1953.

625
687 The internal security measures taken at the different nationalized units of the oil industry became increasingly severe. Confidential reports invariably refer to the heavy secret police supervision of personnel; to armed guards at the wells and along the pipelines; and to arrests, demotions, and deportations for mechanical and other failures.

The proximity of Yugoslavia and Austria to the Transdanubian oil area creates further problems for the communist authorities, necessitating the employment of additional heavy military guards, the screening of all workers for reliability, and an elaborate pass system. There have been border incidents; and the fact that a large part of their oil has to be extracted under the guns of Tito's militia seems to make the Budapest government particularly unhappy.[2 1/2]

648
471
315 Some recent and as yet unconfirmed reports state that the Hungarian government entered into a barter agreement with Soviet authorities according to which the formerly MAORT concession (the areas west of the Danube) and the National Transdanubian Oil Company (also formerly MAORT) were merged into Maszovol. As its part of the bargain the Soviet Union returned sixty-nine former German enterprises to the Hungarian government. This "generous" act of the Soviet Union was reported by Budapest newspapers as having taken place on 30 September 1952, but no mention was made of the oil deal.

If this information proves to be true, the entire Hungarian oil industry is now directly controlled in theory as well as in practice by a Soviet oil combinat in Moscow.

315 A discovery reported at Surd, south of Nagykanizsa, on the Inke structure, has been referred to above. There

2 1/2 [Cf. cat. 116, p. 73 for source -- Analyst]

RECENT DEVELOPMENTS

315

is no other information available and pending further confirmation, we may consider it as nonproductive.

The discoveries made in the Nagylengyel-Gellénháza area sometime in 1950 or 1951, however, seem to be of a more substantial nature.

According to some early information the wells at Nagylengyel were producing 140 to 210 barrels a day from about 6,000 feet. Another communication, which possibly refers to the same field, tells of a 1951 discovery of "structures around Lake Balaton" where ten wells were averaging 1,144 barrels daily, a highly questionable figure.[3] A report of 25 January 1952 refers to exploratory drillings between Bak and Nagylengyel (i.e. the town of Gellénháza). Another report, dated 12 January 1953 and entirely devoted to Gellénháza states that oil was struck in Gellénháza early in June 1952 by crews of the National Transdanubian Oil Company at about 7,870 feet. On 29 June 1952 four wells were functioning, one of them setting a new Hungarian record by producing 24 cubic meters (about 150 barrels) of oil per hour. By late August there were 10 to 12 derricks and the whole exploitation was proceeding at a hectic tempo. Housing for 150 workers and other buildings were ordered constructed at the field. Extravagant claims as to the potentialities of this field ("will double the output of the country") must be strongly discounted. However, the existence of important operations in the area, and of at least some success in extracting oil is proved by abundant circumstantial evidence.

There was also an early report with no further confirmation, claiming the existence of several producing oil wells and of very substantial gas discoveries in the Tófej region. Tófej is about eight miles south of Gellénháza and five miles west of the old MAORT field of Hahót.

Apparently, considerable exploration is under way at the western end of Lake Balaton (see Gellénháza area, above). Drillings were begun in August 1952 in the marshes along the shores of the lake near Fenékpuszta, south of Keszthely. A specially equipped exploratory ship is being

3 [Op cat. 116, p. 73 for source -- Analyst]

RECENT DEVELOPMENTS

315 rushed to completion. The plans call for intensified explorations during 1953 under Lake Balaton and in the general Balaton area.

The "discovery of new oil fields" at Vétyem and Kiscsehi, west of the Lispe field, was reported as early as 1948. Since these villages lie on the Budafapuszta structure, the discoveries are at most extensions of the Lispe field, or small separate productive areas on the same structure. A well drilled at Vétyem in 1947 produced 40,000 cubic feet of gas daily from sands between 4,302 and 5,328 feet. The well was further tested for oil,[1] and these tests may have been successful. Another well drilled on the Budafapuszta structure at Obornak, six miles northwest of Nagykanizsa, is reportedly yielding 7,000 cubic feet of gas daily, of which 5 percent is helium.

The abandoned Újfalu field has been reopened. New wells are reportedly producing 35 to 42 barrels daily from deeper horizons, at about 4,900 feet.

Finally, in June 1952 Magyar Nemzet reported that two former MAORT geophysicists, now working for the Geophysical Institute, were decorated in 1952 for discovering "what may prove to be the most important oil field in Hungary." While the place of discovery was not revealed, a remark concerning the "sabotage of the American management of MAORT" indicates that the alleged discovery was probably made west of the Danube in the former MAORT concession.

The communists exert great pressure on the Hungarian oil industry for more production and new discoveries, but despite heightened exploratory activities, the Lispe and Lovászi fields remain Hungary's main producers. To increase their production, larger diameter chokes have been inserted in the flowing wells. While this temporarily achieves its purpose, it invariably increases the oil-gas ratio. This, in turn, decreases ultimate recovery by exhausting the gas that can force the oil to the surface. Another method frequently resorted to by Soviet oil experts to increase production is the closer spacing of wells on developed fields. At Lispe and Lovászi one new well is being drilled between every two old ones, reducing the

[1] [Cf. cat. nb, p. 73 for source -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC 1 Hungary EC 1

315 ●

well-spacing from 300 to 150 meters. Within the framework of the program 110 additional wells are called for at Lovászi and 100 at Lispe. While such procedure removes the oil from the ground more rapidly it does not increase the total recoverable production of a field; hence, considering the cost of the new wells, it is uneconomical.

The utilization of the pipeline connecting the Lispe field with the refineries illustrates the above point. Until Soviet seizure it was used exclusively to carry crude oil. From May 1949 until the fall of 1951 it carried oil three days a week and was used to pipe gas to Budapest—about 10.5 million cubic feet daily—the rest of the time. However, since late 1951 no more gas has been delivered to Budapest, presumably due to the constantly decreasing production at Lispe.

It is interesting to note that according to a report of April 1952, drastic camouflage measures were taken at the pipeline's Kápolnásnyék pumping station in Fejér County. Other main pumping stations are at Ujudvar, Zala County; Balatonbaglár, Somogy County; and Mezöszentgyörgy, Veszprém County.[51]

Eastern Hungary

According to the Potsdam agreement, the former MANAT concession was taken over by Russia as a German asset. Up to the end of the war no production had been realized in this concession except for the few gas wells on the Körösszegapáti structure which produced wet gas with a high carbon dioxide content. Because of the considerable investment involved in cleaning it, this carbon dioxide content would make the utilization of the gas rather complicated. The necessity for further exploration for oil and the risks involved made the MANAT concession a liability rather than an asset for Russia. In order to change this condition, that is, to have Hungary pay for the oil developments, the Hungarian-Soviet Oil Company, Maszovol, was formed in 1946. Fifty percent of this company was owned by the Soviet Union and 50 percent by Hungary. Russia contributed the MANAT concession—actually a liability—and Hungary contributed the government's refinery at Szöny, and the 15 percent royalty on the production of the MAORT concession, both of which were assets. It should be remem-

[Cf. cat. IIb, p. 73 for source 61 -- Analyst]

•315 bered that this was before the confiscation of MAORT.

It appears that in the hope for quick success Maszovol drilled its first exploratory wells on the prospects outlined by the German exploration. The fifth well on the Körösszegapáti structure started by the Germans was completed by Maszovol as a gas well. Two more holes were drilled on this structure, but no commercial oil production was obtained.

Maszovol also drilled two or three wells on the Biharnagybajom prospect previously mapped by MANAT. The first well produced salt water with a negligible amount of oil at 3,300 feet from probably Miocene formations. The other wells were also failures. As soon as the oil traces in the first Biharnagybajom well were reported it was propagandized as a "big new discovery" and the news was spread through the world press. No other news was released about the Maszovol activities. It seems safe to state that no important discovery has yet been made within the Maszovol territory.

Northeastern Hungary

The Hungarian government has conducted an intensive postwar exploration campaign in the area east of the Danube and north of the Maszovol concession, especially along the northern margin of the Great Hungarian Plain.

According to one report widely quoted by Western oil publications: "Additional oil structures were found be-
[135] tween Eger and Gyöngyös, along the Mátra Mountains; however, drilling-equipment shortage prevented more than two wells being completed in 1951...each producing slightly more than 38 barrels daily."[8]

Another unconfirmed report states that a new oil field has been discovered near Mezötúr, about 20 miles east-southeast of Szolnok.[7] Presumably a test well was drilled on the gravity maximum discovered north of Mezötúr by prewar surveys of the Eötvös Geophysical Institute. A few months later this Mezötúr "field" was reportedly turned over to Maszovol for exploitation.

Rumors persist of an important strike near Mezökeresztes in Borsod-Gömor County. According to reports, the extensive surveying of the area by the Eötvös

[8] [OA. cat. no. 6, p. 73 for source -- Analyst]

RECENT DEVELOPMENTS

315 ●

Geophysical Institute under the direction of Professor Elemér Vadász and under the supervision of Maszovol was concluded in November 1951. Oil was discovered in the Mezökeresztes area, whereupon the government promptly decided on a large-scale exploitation, despite the experts' cautious predictions. Other reports mention "desperate drilling activity to start production," and the "existence of 17 active rigs near Mezökeresztes, which are clearly visible from the trains." The report adds that actual production has not yet started.

[135]

A previously discovered gravity maximum at Bugyi, about ten miles south-southeast of Budapest, has been drilled. Mesozoic rocks, without oil or gas shows, were reached at a shallow depth.

Finally, some success but no commercial production has been reported from another drilling operation at Gödöllö, about ten miles northeast of Budapest.

It is apparent that since 1948 very substantial surveying of exploratory activities has taken place in northeastern Hungary, but that up to 1952 no large quantities of oil have been extracted. Fairly large-scale exploration continues, however, in the vicinity of Mezökeresztes, Borsod - Gömor County, and at Mezötur, southeast of Szolnok.

As everywhere else in Hungary, the prospecting is done by the Eötvös Geophysical Institute, while it can be inferred that the actual drilling ("exploitation") has been undertaken by Maszovol since 1948.

315
439

According to an agreement between Hungary and Romania concluded on 17 June 1952, as reported in the official communist press of both countries, [8] Romanian natural gas was to be used by a chemical plant in Hungary. In return Hungarian experts were to build a chemical combinat called ROMACHIM. Hungary was to deliver the equipment for the production of "soda" (Na_2Co_3, Na_2OH, KOH and their derivatives) for the benefit of both countries' economies. A joint Hungarian-Romanian pipe-

[8] [Cf. cat. 116, p. 73 for source -- Analyst]

RECENT DEVELOPMENTS

315 [439] line was to be built. The location of the plants and of the projected pipeline was not disclosed.

Subsequently, it has been reported that a pipeline was completed late in 1952 between Oradea, Romania, and Komádi, Hungary, and that construction was proceeding through Körösladány and Mezötúr to Tószeg, south of Szolnok. A branch line to Debrecen was also planned. Although details of this construction project are not yet confirmed it is highly significant that Transylvanian natural gas is being piped to Hungary. It indicates that: No substantial gas discoveries have been made in eastern Hungary during the last few years, and none are hoped for at the present; and that natural gas output has been greatly increased in western Romania, either as the result of the discovery of a gas field in the area south of Oradea or of a spectacular jump in the output of the Transylvanian Basin.

Recent Production

OOO The preceding sections have presented a comprehensive picture of oil and gas fields and oil and gas occurrences in Hungary, production and reserve data, and exploration activities by the Hungarian government and the various prospecting companies.

One of the main objectives of this study is to provide information about Hungary's production potential under the present communist regime. The secrecy cloaking economic activities in all communist countries hinders the accurate fulfillment of this objective; but it is probable that the estimates given in Table IV are not very far from actual production figures for individual fields.

135 315 Before the Iron Curtain closed on Hungary, the following oil fields were known: Lispe; Lovászi; Újfalu; Hahót, with a separate oil occurrence at Söjtör, at the eastern end of the structure, and with a wet gas field at Ederics; and Bükkszék. According to more or less reliable reports, commercial oil occurrences have since been found at: Gellénháza-Nagylengyel; Surd; Tófej; the

RECENT DEVELOPMENTS

[135] 315

Lake Balaton region (perhaps identical with Nagylengyel); Kiscsehi and Vétyem (extensions of the Lispe field); along the Mátra Mountains, at Mezötúr, and Mezökeresztes. While no reliable or comprehensive production data have been made available for these new discoveries, the estimated 1947-1952 production of all fields is given in Table IV.

315 433

The million-barrel jump from 1950 to 1951 shown in the first World Oil version is highly improbable and was sharply reduced a year later. It could be explained only by the development of a large new field. As it took two years to bring Lispe production to one million barrels, it would appear unlikely that a hypothetical new field could achieve such production in one year, particularly considering the shortage of drilling equipment, and in view of the fact that much of the available equipment was employed drilling new wells in the Lispe and Lovászi fields.

It might be argued, in view of the United Nations figure for 1950 that a million-barrel jump was achieved in two years. It must be emphasized, however, that the U.N. estimates are based on data from official government, namely communist, sources, which are hardly to be relied upon, and conflict with 1950 production figures from all other sources.

Even a 500,000-barrel increase in Hungary's oil production in a year's time would require hard work and exceptionally good luck. There are wells with prolific production (gushers) in several regions of the world, but such wells are very improbable in Hungary considering the geological conditions. If an oil field of the type at Lispe or Lovászi were discovered, and twelve producers were drilled within one year, production in that year would increase by 300,000 barrels, and in the following year, assuming twelve additional producers, by another 600,000 barrels. Meanwhile, production would continue its natural decline in the older fields.

The 1949-1951 production estimates of Table IV† may be too conservative; it is unlikely, however, that production

† [See page 86 -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

315
433

exceeded 3,800,000 barrels in any of these years, and any 1951 production figures over 4,000,000 barrels should be viewed with grave suspicion.

The figures for 1952 have to be considered as rough estimates. We know definitely that productivity in the old Zala fields has long passed its peak and is now declining. This decline, which normally would be more pronounced, was slowed down, at least temporarily, by costly and at time desperate measures taken by the communist authorities (see appendix).

The production of new discoveries remains unknown due to communist secrecy and because available reports are so vague, unreliable, and contradictory that no clear picture emerges from them. Allowance must be made, however, for an approximately sixfold increase in drilling over 1947 and for a comparable increase in exploration.

The differing estimates should be examined for the year. The low estimates for 1952 assume declines in the production of the old fields from an estimated 3,358,000 barrels in 1951 to 2,660,000 barrels; and only a moderate increase in the production of newly developed areas from 215,000 barrels in 1951 to 550,000 barrels a year later. The low total is 3,210,000 barrels.

The high estimates assume little or no decline at the old fields (stagnation), namely 3,350,000 barrels in 1952; the development of one new field worthy of that name (possibly Nagylengyel-Gellénháza with a production of 1,000,000 barrels); and some scattered production elsewhere (200,000 barrels in Transdanubia and 250,000 in eastern Hungary). The high total for 1952 is 4,800,000 barrels.

The low figure is too low and the high figure is probably too high. They are valuable only as the higher and lower limits of the range where the total Hungarian oil production must have been in 1952. The most probable estimate is about 4,250,000 barrels which represents a moderate increase of about 15 percent over the previous

RECENT DEVELOPMENTS

315
433

year. In this case the assumption is that the decline in the production of the old fields was more than made up by the development of new ones.

The general picture given above is strongly supported by the private reports referred to throughout the text and by estimates arrived at by experts in the Western world. It is also corroborated by a few available official Hungarian government pronouncements and publications. As a summary of the preceding discussion and of the information embodied in Tables I-IV, the following conclusions can be made:

We know that the 1947 production was 570,000 tons (Tables I-IV).

The general consensus is that production fell off sharply in 1948, estimates for that year ranging between 471,000 and 500,000 tons (Table II). The lowest of these estimates should be preferred because it represents the total of a field-by-field analysis of production (Table IV), which was based on reliable inside information.

We have no direct production reports for the years beginning in 1949. Estimates and figures calculated from officially released percentage data for that year range from 457,000 to 518,000 tons. Therefore, it is safe to assume that production rose only very slightly to about 490,000 tons. The official plan report claimed an increase of 3.6 percent over the previous year. It is obvious that the 660,000-ton goal called for in the speeded-up Three-Year Plan was far from being fulfilled, and it was reported that even the reduced, but undisclosed, 1949 yearly target was not reached.[1] Official exhortations and condemnations, purges of personnel, frequent references to the "sabotage" and "wrecking activities" of the formerly American-owned and managed MAORT are further indications of the crisis in the oil industry.

The range of the 1950 estimates is between 455,000 and 550,000 tons with the higher figures being decidedly too high. The best available estimate remains 490,000 tons, plus or minus 5 percent, indicating no appreciable

[1] [cf. cat. IIb, pp. 81-82, 85-86 -- Analyst]

[2] [cf. cat. IIb, p. 73 for source -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

315
433

change in oil production figures from the previous year.

Estimates for 1951 range from 450,000 to 500,000 tons, if we disregard one source giving the preliminary figure of 592,000 that was revised to 460,000 tons. (See Table II, World Oil source.) The safest figure for 1951 is 475,000 tons, indicating a slight reduction from 1950. Available official and private statements support the above theory, and the 1951 production could have been even lower.[10] The exact determination of the 1951 production is important because this year is the basis of actual output figures given for 1952 and also for the 1953 plans.

The year 1952 appears to have been a turning point in crude production. Private reports and official statements definitely point to the development of substantial new producing areas. On the basis of these reports the production of new fields in 1952 was estimated by the Mid-European Studies Center staff (Table IV) as being somewhere between 74,000 tons (550,000 barrels) and 190,000 tons (1,450,000 barrels). The total 1952 production was estimated as being somewhere between 422,000 tons (3,210,000 barrels) and 632,000 tons (4,800,000 barrels) with 560,000 tons (4,250,000 barrels) being the most likely figure.

Official publications claimed that six fields have been put into operation since 1948.[11] Even though this claim is probably a gross exaggeration, it is nevertheless significant. It was also reported that considerably more oil was produced in the third quarter of 1952 than called for by the plan.[12] On 29 November 1952, Ernő Gerő in a speech dealing with Hungary's economic progress revealed that in the first ten months of 1952, 17.6 percent more crude oil was extracted than in the same period of 1951, while the oil industry as a whole was 29.4 percent ahead of the base period.[13] A fortnight later in a speech to parliament, Mátyás Rákosi, Hungary's communist satrap, declared that in the first eleven months of 1952 crude production exceeded that of the same period of 1951 by 18.4 percent.[14] Rákosi added that this was still slightly below the target, but only because transportation bottlenecks

1 [cf. cat. 116, p. 73 for source -- Analyst]
2 [for footnote, cf. cat. 116, pp. 68, 73-74 -- Analyst]
3 [for footnote, cf. cat. 116, p. 74 -- Analyst]

RECENT DEVELOPMENTS

held operations at the new fields below normal capacity. 315 433

Taking the 1951 figure of 475,000 tons, taking Rákosi's statement at face value, and applying it to the whole year rather than only to the first eleven months, a 1952 production figure of 562,000 tons is indicated. In the light of the above discussion this figure is well within the realm of possibility, and with some caution, it can be accepted as correct.

Planned Production

315 185

The Hungarian Three-Year Plan announced in 1947 called for the production of 540,000 tons (4,104,000 barrels) of oil in 1947/48; 600,000 tons (4,560,000 barrels) in 1948/49; and 660,000 tons (5,016,000 barrels) in 1949/50. In 1948 the plan was speeded up to reach the 1949/50 target by the end of 1949. These targets were not reached and only 490,000 tons (3,724,000 barrels) were produced in 1949.

Late in 1949 the Five-Year Plan for 1950-1955 was announced. Its oil goals were not made public. However, information leaking from Hungary indicated that the 1952 target was 500,000 tons (3,780,000 barrels) and a 1953 target of 575,000 tons (4,340,000 barrels) was also given. These are much more modest than the Three-Year Plan goals. Either they are incorrect or the planners have lowered their sights.

It was officially announced on 15 December 1952 that crude oil production in 1953 is to be 25 percent over 1952, which in turn ran 18.4 percent over 1951 during the first eleven months. Therefore, depending on whether the 1951 production was 450,000 tons, the lowest estimate, or 500,000 tons, the highest estimate, the 1952 production must have been between 533,000 and 592,000 tons and the 1953 target is 25 percent over this, namely somewhere between 666,000 and 740,000 tons. In this study we accepted 475,000 tons as the 1951 figure which gives 562,400 tons for 1952 and a target of 693,000 tons for 1953. It is apparent that the production targets have been revised both upward and downward several times.

RECENT DEVELOPMENTS

• 315

Various plans, as reported by different sources, call for 110 new wells at Lovászi and 100 at Lispe to implement the doubling of producers in those fields. Fifty to 100 wells are to be drilled in other areas of Transdanubia and perhaps up to 50 in areas east of the Danube. Thus, the plans call for over 300 new wells to be completed in a period estimated between one and two and a half years.

The exceptionally high number of wells to be drilled is corroborated by other reports which give the 1953 drilling target as 263,000 meters (852,800 feet), or about 170 wells of average depth.

It is very likely that this overambitious program will run into several difficulties and it is more likely than not that, as in previous years, it will fall short of the goals. The persisting acute shortage of engineers, of skilled laborers, and of equipment are reasons for this assumption. Moreover, much of the carry-over equipment is worn out, and new equipment provided by the Soviet Union is usually of inferior quality. Russian-made diesel engines, for example, must be completely overhauled after 400 to 800 hours, while American diesels run efficiently after 3,000 hours under normal operating conditions. According to drilling experts the two types of drilling equipment Russia sends to her satellites—the BU-40 light and the UZTM medium—are copies of outfits previously supplied to the Soviet Union by an American firm, Dresser Industries, Inc. Hungary has also been trying to obtain drilling equipment from Austria, Italy, and France.

The difficulties listed above and the statement that the plan may be seriously underfulfilled should not distract attention from its magnitude. The drilling planned for 1953 must be compared with the grand total of only 3,729 meters drilled by the D'Arcy Exploration Company (Anglo-Iranian) in 1921-1925; 8,557 meters drilled by Eurogasco in 1935-1937; and 430,125 meters drilled by MAORT on its Zala fields in 1937-1945. Thus, the 263,000 meters planned in 1953 is more than five times the 1937-1945 MAORT average.[15] 1/A

1/A [Cf. cat. 116, p. 74 for source -- Analyst]

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

RECENT DEVELOPMENTS

Estimated Reserves

315
135

Estimates of initial recoverable reserves are only available for oil fields in operation in Hungary prior to 1948—the Zala fields and Bükkszék. These estimates, in millions of barrels, were 30 for Lispe, 35 for Lovászi, 7.5 for Hahót, and 0.3 for Bükkszék. The Újfalu reserves were negligible. Thus, total initial recoverable reserves were estimated at 72.8 million barrels for these fields.

Total production by the end of 1952, in millions of barrels, was about 21 for Lispe, 30 for Lovászi, 4.3 for Hahót, and 0.1 for Bükkszék, for a total of 55.4 million barrels. This leaves 17.4 million barrels net to be produced from these fields.

Most of this remaining reserve—14 million barrels—is at Lispe and Lovászi. The reckless exploitation of these fields, previously described, has reduced this figure considerably, but expensive new methods resorted to may have restored it again. Thus, if new developments were largely unsuccessful, the low estimate of Hungary's known recoverable reserves could be as low as 17 million barrels.

If, on the other hand, we assume the discovery of one field such as Lovászi, with 35 million barrels of initial recoverable reserves, and of moderate success elsewhere, the high estimate of reserves could be between 55 and 65 million barrels. This would closely correspond to the situation in 1942, when the newly discovered Lovászi field was put into full-scale operation and proved recoverable reserves were slightly over 60 million barrels.

During the last three years communist authorities have claimed strikes more important than Lispe or "richer than the Zala fields" in the Nagylengyel, Lake Balaton, Mezötur, and Mezökeresztes areas, as well as in the former MAORT and MANAT concessions in general. Some of these claims were repeated by escapees, or otherwise found their way into the technical press of Western countries.

RECENT DEVELOPMENTS

315
135

At face value, these claims add up to anywhere between 100 and 250 million barrels of proved reserves, depending on how they are interpreted. However, it must be emphasized that such statements are always vague and unsubstantiated, often contradictory, repetitious, or overlapping, and out of line with constant sharp official reproaches to and condemnations of the oil industry. However, in the light of the Rákosi and Gerő speeches at the close of 1952 the existence of proved reserves of the magnitude of 100 million barrels remains a possibility.

315
433

12; Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

TABLE IV

Oil Production by Fields, 1947-1952

Field	1947	1948	1949	1950	1951	1952
	(in thousand barrels)					
Old Fields						
Lispe	1,235.55	1,097.00	1.050	1,100	1,050	700-1,000
Lovászi	2,625.15	2,145.59	2,123	2,000	2,000	1,700-2,000
Újfalu (reactivated)				5	7	10-50
Hahót	468 66	337.00	300	350	300	250-300
Bükkszék	1.50	1.30[a]	1.3		1.3	1-2
New Discoveries						
Transdanubia					200[b]	500-1,200
East of the Danube					15[b]	50-250
Total	4,330.86	3,580.89	3,474	3,456	3,573	3,210-4,800

[a] Estimate

[b] Second half of year; previous production was negligible.

Sources: 1947-1948 data compiled by MESC associate from detailed production reports; 1949-1951 data estimated by authoritative MESC consultant; 1952 data estimated by MESC staff.

TABLE VI

382 Civilian Consumption of Petroleum Products, 1940-1943[a]

Product	1940	1941	1942	1943
	(in metric tons)			
Gasoline	84,000	95,800	74,000	88,000
Kerosene	85,000	70,600	84,000	78,000
Diesel oil	37,000	48,100	52,000	60,000
Fuel oil	30,000	37,700	24,000	33,000
Lubricating oil	23,000	30,000	33,500	24,000
Asphalt and pitch	12,000	24,500	26,800	24,000
Paraffin wax	3,000	4,500	4,700	4,700
Total	274,000	311,200	299,000	320,700

[a] During this period civilian products were rationed.

Private source.

TABLE VII

● 315 Natural Gas Production of the Zala Fields, 1937-1945

Year	Total Production	Wasted	Returned to Formation	Used by the Company	Sold
1937	2,315	1,396	—	919	—
1938	14,999	10,045	—	4,955	—
1939	46,310	35,842	83	10,396	—
1940	75,882	43,411	6,884	25,587	—
1941	136,597	101,399	2,793	32,405	—
1942	212,925	137,570	31,529	43,827	—
1943	266,109	142,187	66,199	56,784	939
1944	310,722	166,273	70,646	71,532	2,271
1945	363,456	218,204	70,697	70,862	3,693

Note: Symbol — equals none.

Source: Simon Papp, "Nyersolajkutatás és termelés Magyarországon," Magyar Kémikusok Lapja (Budapest), I, No. 6 (25 November 1946), 91.

• 315 439

TABLE VIII

Oil Production, Imports, and Exports, 1937-1944

Year	Domestic Production	Imported Synthetic Crude	Imported Refined Products	Total Imports	Exports (Mainly Refined Products)
	(in metric tons)				
1937	2,895	237,630	42,370	280,000	n. a.
1938	42,813	173,700	35,870	209,570	—
1939	143,791	150,992	30,860	181,852	—
1940	250,417	33,699	8,012	41,711[a]	—
1941	422,138	n. a.	n. a.	10,000	60,000[b]
1942	665,201	—	n. a.	n.a.	300,000[b]
1943	838,068	—	n. a.	n.a.	460,000[c]
1944	810,162	—	—	—	500,000

[a]Estimate.
[b]Calculated estimates, including the estimated requirements of the Hungarian Army in Russia.
[c]Exported to Germany or seized and used by the German Army in Hungary.

Note: Letters n.a. indicate figures not available but amount negligible; symbol — equals none.

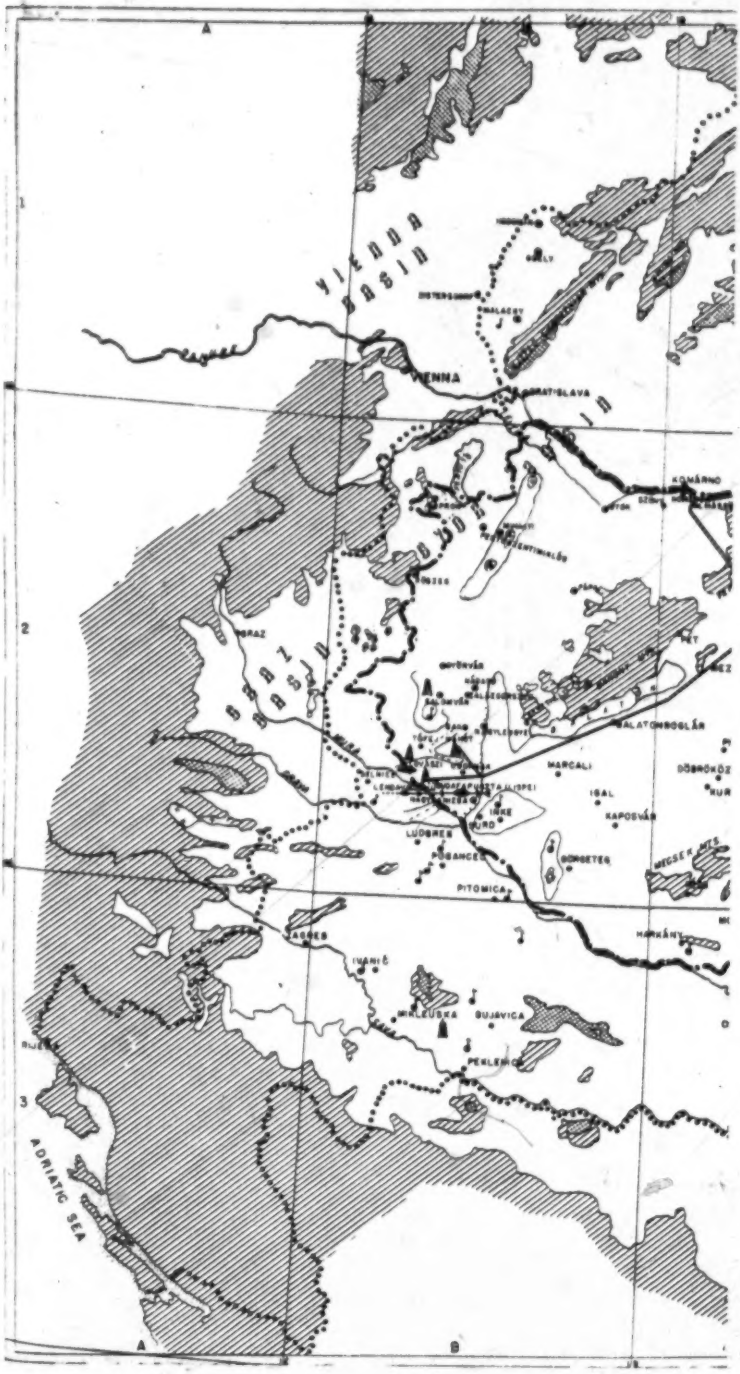
Sources: Simon Papp, "Nyersolaj és földgáz Magyarországon," Magyar Technika (Budapest), I, No. 6 (October, 1946), 206; Mihály Freund, "A Magyar ásványolajipar az elmult száz év alatt," Magyar Technika, III, No. 3 (1948), 90.

12: Free Europe Committee U-4 (no date) 1959 ECI Hungary ECI

OIL IN THE CARPATHIAN BASIN

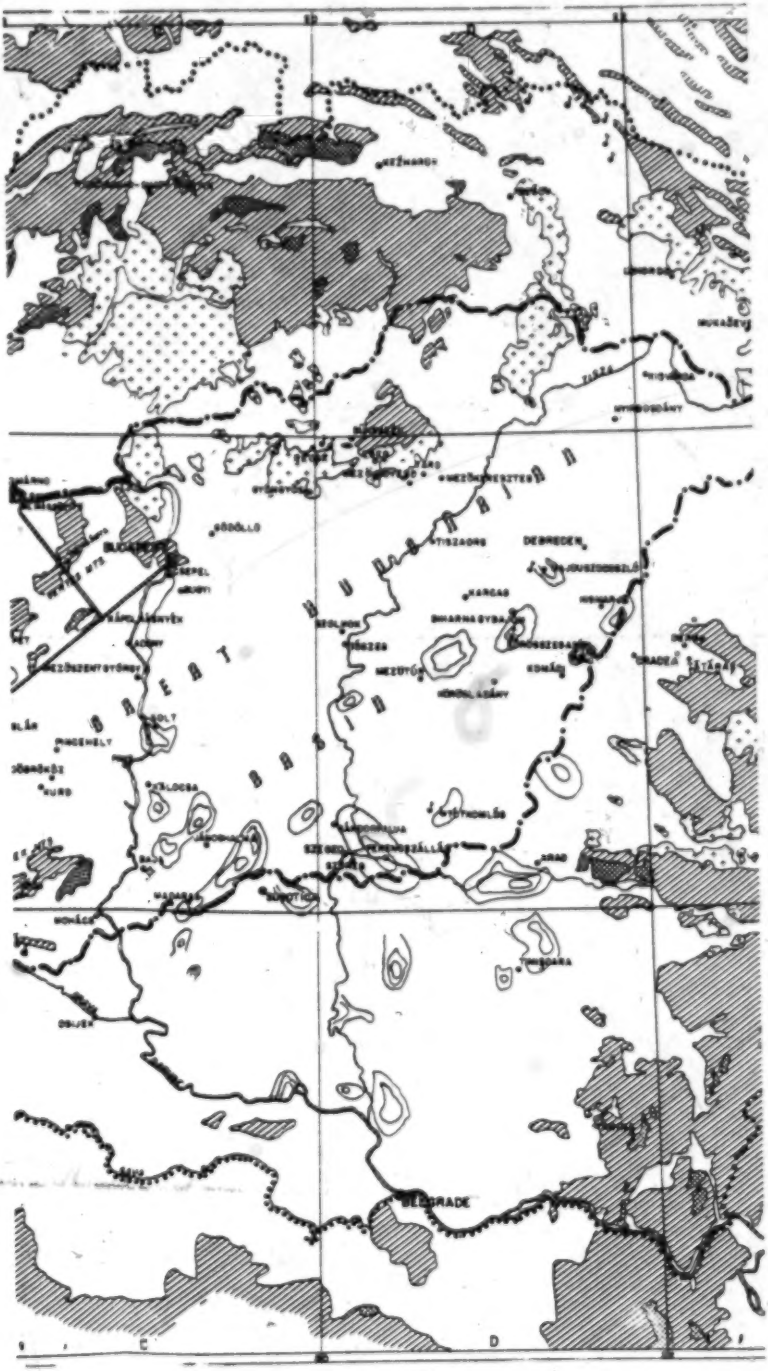
315
135

135
315



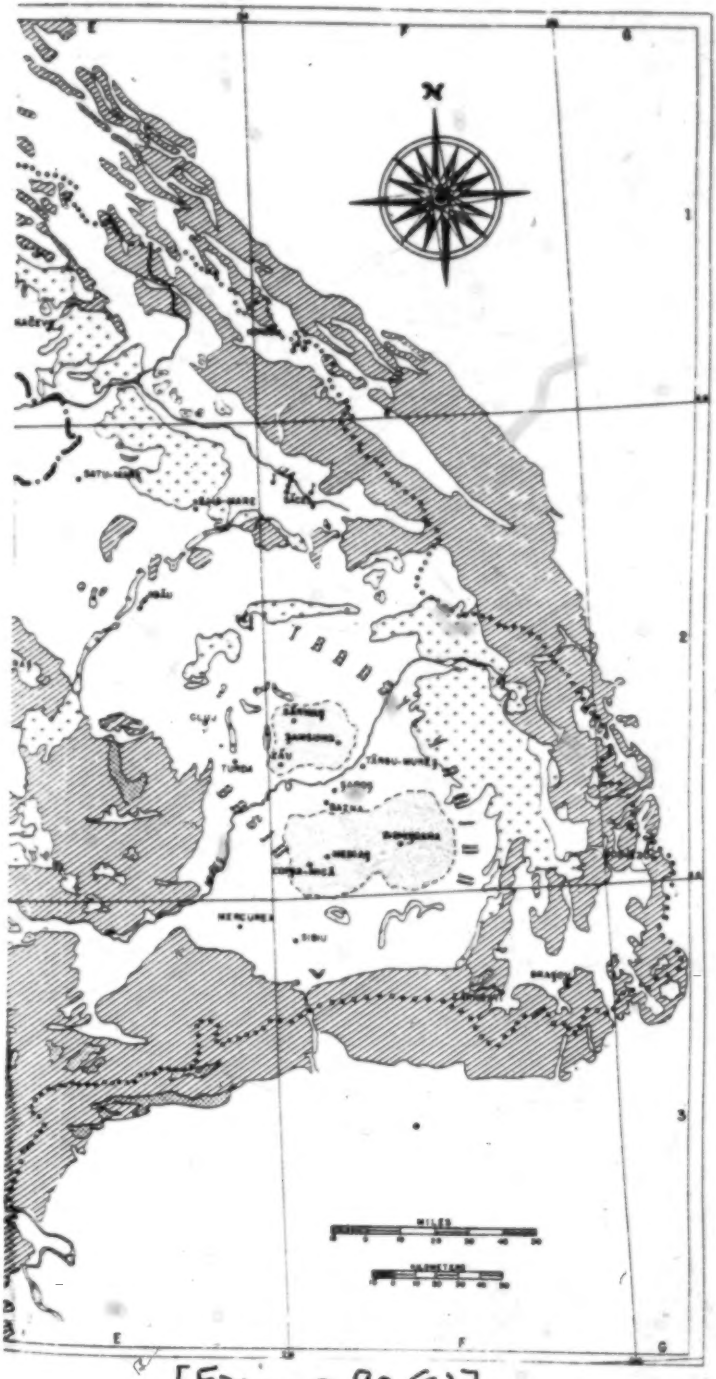
[Facing p. 90(a)]

135
315



[Facing p. 90(b)]

315
135



[Facing p. 90 (c)]

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

INDEX TO MAP

●315
135

Abbreviations

Aus.,	Austria
Czech.,	Czechoslovakia
Hung.,	Hungary
It.,	Italy
Rom.,	Romania
Yugos.,	Yugoslavia
mts.,	mountains
riv.,	river

Note

All places are in post-1945 Hungary, unless otherwise designated. Previous Hungarian names are in parentheses.

Adony C2
Almásfüzitő C1
Anina, Rom. D3
Arad, Rom. D2

Baia Mare, Rom., (Nagybánya) ... E2
Baja C2
Bak B2
Bakony, mts. B2
Balaton, lake B2
Balatonboglár B2
Bazna, Rom., (Bázna) F2
Belgrade D3
Biharnagybajom D2
Braşov, now Orasul Stalin, Rom., (Brassó) F3
Bratislava, Czech., (Pozsony) B1
Budafapuszta B2
Budapest C2
Bugyi C2
Bujavica, Yugos. B3
Bükkszék D2

Cluj, Rom., (Kolozsvár) E2
Coppa-Mică, Rom., (Kiskapus) .. F2
Csepel C2

Danube, riv. C2
Debrecen D2
Dej, Rom., (Dés) E2
Derna, Rom. E2
Döbrököz C2
Drava, riv., Hung., Yugos., Aus. . B2

Eger D2

Ferencszállás D2
Fertő tó, lake, (Neusiedler See, Aus.) B2
Fertőszentmiklós B2

Gbely, Czech., (Egbell) B1
Gödöllő C2
Görgeteg B2
Graz, Aus. A2
Gras Basin A2
Great Hungarian Basin C2, D2
Gyöngyös C2
Győr B2
Győr Basin, Hung., Czech. B1, B2
Győrvár B2

Hahót B2
Hajdúszoboszló D2
Harkány C3
Hodonín, Czech. B1

Igal B2
Inke B2
Ivanic, Yugos. B3
Iza, riv., Rom. F2

Jánoshalma C2
Jibău, Rom., (Zsibó) E2

Kalocsa C2
Kápolnásnyék C2

•315
135

INDEX TO MAP

Kaposvár B2
Karcag D2
Kežmarok, Czech., (Késmárk). D1
Kesthely B2
Kismarja D2
Kisvárda E1
Komádi D2
Komárno, Czech. C2
Komárom C2
Körösladány D2
Körösszegapáti D2
Kőszeg B2
Kurd C2

Leitha, riv, Aus., Hung. (Lajta) B2
Lendava, Yugos., (Alsólendva). B2
Lendvaújfalu B2
Lispe B2
Lovászi B2
Ludbreg, Yugos. B2

Madaras C2
Malacky, Czech., (Malacka) ... B1
Marcali B2
Mecsek, mts. C2
Mediaș, Rom., (Medgyes) F2
Mercurea Niraj, Rom., (Nyárádszereda) E3
Mezőkeresztes D2
Mezőkövesd D2
Mezőszentgyörgy C2
Mezőtúr D2
Mihályi B2
Miklenska, Yugos. B3
Mohács C3
Mukačevo, U.S.S.R., formerly Czech., (Munkács) E1
Mura, riv., Hung., Yugos., Aus. B2
Mureș, riv., Rom., (Maros) D2, E2

Nádasd B2
Nagykanizsa B2
Nagylengyel B2
Nyírbogdány D1

Obornak B2
Oradea, Rom., (Nagyvárad) D2
Osijek, Yugos C3

Paks C2
Pápa B2
Pécs C2
Peklenica, Yugos., (Bányavár) B3
Pét C2
Pincehely C2
Pitomaca, Yugos. B2
Pogancec, Yugos. B2
Prešov, Czech., (Eperjes) D1

Racak C2
Rijeka, Yugos., (Fiume, It.) A3

Săcel, Rom., (Izsaszacsal) F2
Salomvár B2
Șamșund, Rom., (Mezősámsond) ... F2
Sándorfalva D2
Sărmaș, Rom., (Sármás) F2
Șaros, Rom., (Magyarsáros) F2
Satu-Mare, Rom., (Szatmárnémeti) E2
Sava, riv., Yugos., (Száva) B3, C3, D3
Selnica, Yugos., (Szelencse) B2
Sibiu, Rom., (Szeben, Nagyszeben) F3
Sighișoara, Rom., (Segesvár) F2
Solt C2
Sopron, (Ödenburg, Aus.) B2
Sőrmező C2
Subotica, Yugos., (Szabadka) C2
Surd B2
Szeged D2
Szolnok D2
Szőny C2
Szőreg D2

Tard D2
Târgu-Mureș, Rom., (Marosvásárhely) F2
Tatabánya C2
Tătăreș, Rom., (Tatáros) E2
Timișoara, Rom., (Temesvár) D3
Tisza, riv., Hung., Rom., Yugos., Czech. D1, D2, D3
Tiszaőre D2

12: Free Europe Committee U-4 (no date) 1954 EC1 Hungary EC1

315
135

INDEX TO MAP

Tőfej B2
Tőzeg D2
Tőkemlós D2
Transylvanian Basin E2, F2
Turčianský-Svatý Martin, Czech.,
(Turócszentmárton) C1
Turda, Rom., (Torda) E2

Újfalu, see Leudvájfalu B2
Uzhorod, U.S.S.R., formerly
Czech., (Ungvár) E1

Vértes, mts. C2
Vienna, Aus. B1
Vienna Basin, Aus. B1

Zagreb, Yugos. A3
Zalaegerszeg B2
Zărnești, Rom., (Zernyest) F2
Zău, Rom., (Menčáh) F2
Žilina, Czech., (Zsolna) C1
Zistersdorf, Aus. B1

APPENDIX

The Great New Tasks of Our Petroleum Industry

382

Note: This article was written by an important Hungarian government official and appeared in the Budapest daily Szabad Nép (31 January 1952, p. 6), the central organ of the Hungarian Communist Party. It represents the official communist version of the Hungarian oil industry's past, throws some light on its present status and problems, and gives some indication of its future development. The article is reproduced below in its entirety.

000 One of the most important raw materials of our economy is petroleum. Oil is needed to keep the thousands upon thousands of our industrial machines humming; oil is needed so that the tractors of our machine stations can help our working peasantry; oil is needed for the running of cars, trucks, and buses; oil and natural gas are also two of the most important basic raw materials of the chemical industry.

315
471 Oil is not an old branch of industry in Hungary. Before the 1930's we had no oil mining. In 1933 the Horthy regime with its infamous Law No. XIX illegally transferred the right of oil exploration and production in Transdanubia to Standard Oil, an American company. This was a good deal for the American capitalists; the government of the gentlemen's regime gave them preferential treatment and opportunities for predatory exploitation. Zala County, rich in oil resources but economically and culturally backward was an especially favorable area for reaping extra profits. During the Second World War, Hitler and the American stockholders were in happy partnership. Oil production for the benefit of the fascist war machine was constantly

[p. 94 is blank]

APPENDIX

315
[471] increased in the MAORT fields until it reached its peak in 1943-44. All this became clear as day during the memorable MAORT sabotage trial.

The American capitalist monopoly continued its anti-people policies in the Hungarian oil fields even after the liberation. It directed production in a manner that gave the least possible oil to popular-democratic Hungary. However, finally we uncovered and brought to justice the malefactors of MAORT, and the State took over the direction of our oil production.

After the nationalization we were still confronted with serious difficulties. Because the robber-economy of the Americans made such demands on the technical equipment the installations were in a rundown condition when we took over. Our difficulties were further increased by the fact that the American imperialists tenaciously tried to maintain their position by leaving their agents in countless sectors of oil production and even in the top leadership of the industry. Under the direction of the party and with the effective cooperation of the workers we unmasked the hostile elements one after the other. Crude production was also handicapped for a long time by the lack of equipment and materials and by the fact that Hungarian experts had no experience in the socialist management of the oil industry.

[648] During the past year, 1951, the oil industry came to a turning point. Here too it was the Soviet Union that gave us help.

At the invitation of our party and our government Soviet experts with great specialized knowledge and a wealth of experience came to our homeland. Their advice led to magnificent results.

The first task was to start oil exploration, without which there can be no expansion of the industry. This was necessary because the damage-doers in American pay had completely stopped exploration.

APPENDIX

315 ●
[135]

During the last year the method of exploration was basically changed. With the application of Soviet experience up-to-date seismic (artificial earthquake) exploration was carried out in Hungary for the first time. New treasures of the Hungarian earth were found in many places previously believed to be unimportant. The decline of the old fields, which were so mercilessly "robbed" by American capitalists, was offset primarily by the production of these new areas.

With the introduction of modern methods we were able to stop the alarmingly rapid decline in the production of oil wells. "Secondary" production method were started. These consist of increasing the water or gas pressure in the oil-bearing strata, which then drives the oil to the surface. The American capitalists did not care if this pressure diminished and thereby less oil became available to our people's economy. The socialist oil drilling, however, has already progressed far in eliminating this grave capitalist "inheritance." The help of the Soviet Union had countless aspects. We imported many drilling installations from the Soviet Union and drawing on Soviet experience we began manufacturing our own drilling equipment. We applied Soviet-style fast-drilling and we electrified our oil fields. Our oil experts advanced their knowledge; many of them undertook trips to the Soviet Union and to the people's democracies and had the opportunity to learn a lot from the oil experts of these friendly countries.

[648]

It is due to these achievements that—although at the beginning of 1951 our oil production fell seriously behind the targets set in the plan—production greatly increased during the last month of the year and finally the industry as a whole, expressed in the value of the product, fulfilled its plan to 99.8 percent.

What Comrade Gerő [Ernő Gerő at that time Premier Deputy in Charge of Economic Affairs and now Deputy Premier and Minister of Interior] said at the National Production Activa can also be applied to the petroleum industry: "Our results could have been a great deal better if some of our production leaders had not succumbed

APPENDIX

•315 to the opinion that the plan can not be fulfilled."

[647] That this attitude prevailed for so long in the oil industry was largely the responsibility of the Petroleum Production Section of the Ministry of Mining and Energy. The section did not look far enough ahead. Instead of massing its forces on the decisive problems of industry's development, it was snowed under by small day-by-day problems. It did not fight with great force against the damaging doubts of the disbelievers. Little was done by the section to improve the coordination of different aspects of the industry. Mistakes occurred in the introduction of the more competitive wage scale, and insufficient attention was paid to the strengthening of work discipline.

Great advances are possible for our oil industry. The leaders of this branch of industry as well as its workers will have to fight with the spirit of the last months of 1951 for the complete elimination of falling behind the goals and for the successful fulfillment of the plan, and its overfulfillment.

This year they will have to complete 66 percent more exploration and exploitation than last year. Production will increase considerably: 14 percent more crude oil, 13 percent more casing-head gasoline, and 38.5 percent more propane-butane will have to be produced.

What tasks will have to be undertaken by the petroleum industry in the service of the great goal? First of all, up-to-date methods of production will have to be introduced on a larger scale than that achieved in the past. As an example, the technique of "sweeping oil with water" can be mentioned. (Water is pumped under the oil layer to drive the oil to the surface.) The preventive maintenance of the wells will have to be better organized. Great tasks are also awaiting the oil explorers. Instead of the often self-centered, purely theoretical geological explorations of the past, geological knowledge will have to be increasingly applied in a practical manner. The tasks demand that the Hungarian industry deliver more up-to-date drilling and well-maintaining installations, more deep-pumps, and more compressors to the oil industry.

1 [sic -- Analyst]

APPENDIX

pumps, and more compressors to the oil industry. 000

315 ●
461

The workers are tackling their increased tasks with great enthusiasm. As an example, the workers of the crude production enterprise, of the cracking installations, and of the carbon-black plant, all in Lovászi, have taken it upon themselves to eliminate unexcused absences and to increase the number of Stakhanovites by 10 percent; and the drilling workers pledged that they will save cement and lumber worth more than half a million forints. The total value of pledged savings in material at Lovászi exceeds one million forints. The workers of this enterprise challenged to work competition the workers of the Budafa oil-producing enterprise, the personnel of the Oil Exploration and Deep Drilling Company, and the workers of oil enterprises located in Zala County. They are fighting to reach the best possible position in the competition: as an example, during the first twenty days of January the workers at the Lovászi oil-producing enterprise fulfilled their plan to 104.6 percent. The competition called in the honor of Comrade Rákosi's [Mátyás Rákosi, former Vice Premier and communist dictator of Hungary] sixtieth birthday is developing with great élan among the workers of the oil industry. We are following in the footsteps of Soviet oil production and we are certain that during the Five-Year Plan we will reach even greater successes.

Vilmos Bese
Chief of the Mineral Oil Mining Section, Ministry for Mining and Energy